



heard of four being met with. In two instances, I see by my notes that single fully incubated eggs were found.

In this species I have invariably found the female sitting, but the male is always near at hand, and very commonly sitting on some branch immediately above the nest. I once shot a female sitting on a partly incubated egg, and on skinning her found a second egg in the oviduct ready for expulsion. I have repeatedly taken one perfectly fresh and one partially incubated egg out of the same nest, and it seems clear that these birds, like the Harriers and many Owls, begin to sit directly the first egg is laid.

Colonel Butler writes :—“Sukkur, 24th January, 1879, a nest in the fork of a kundee-tree about 30 feet from the ground. It consisted of ordinary sticks like an old Kite’s nest, and the tree upon which it was built was bare and leafless, recalling to mind the figure of the nest of *Ketupa ceylonensis* in Colonel Marshall’s book on ‘Bird’s-nesting in India.’ The tree upon which the nest was built was growing in the middle of a thick group of bare thorny trees, with a clump of date-palms close by, in which the cock bird concealed himself. The hen bird sat close, allowing the boy who ascended the tree to approach within a yard of her before she left the nest. From below she was not visible when sitting, but at a distance of 40 or 50 yards from the tree her cat-like head could be seen occasionally raised above the top of the nest. The nest contained a solitary fresh egg, and strange to say, after it was taken, the hen bird sat closely for at least a fortnight without laying again, allowing me to visit the nest frequently during that period without forsaking it.”

Mr. Scrope Doig writes from Sind :—“Found nests on 15th and 21st February, that contained young ones, two in each.”

Mr. J. Davidson, writing of this species in Khandesh, says :—“Probably a permanent resident, but scarce. I only came across it twice, in both cases in December, breeding.”

Lieut. H. E. Barnes, writing of Rajpootana in general, says :—“The Dusky Horned Owl breeds during December and January.”

Mr. C. J. W. Taylor, writing from Manzeerabad in Mysore, remarks :—“I shot a female off her nest, a mass of sticks, laid between two immense arms of a mango-tree ; the nest contained one hard-set egg. This was in April 1882.”

Mr. J. R. Cripps writes :—“On the deserted ryot’s holding, where I found a nest of *Aquila hastata*, and on a tamarind-tree within 50 yards of the latter nest, was one of this Owl containing a young bird, whose quill-feathers were a couple of inches long. This tamarind-tree stood about 100 yards off the public road, and the nest was placed about 40 feet off the ground in the centre of the tree. It was a huge structure of sticks and twigs, more in fact than a man could carry ; no lining, but the nest contained the remains of a young Urrua and the heads of 15 young *Corvus levantii*, which had evidently supplied many a meal to the young monster. There were also the shells of ever so many Crows’ eggs in the nest ; the smell from all this was very offensive. The female

flew off the nest when my man went up, but I bagged the male, which was sitting on one of the side branches. In this clump of trees the natives said these birds built every year. I took the young one home, and he lived for over a month, feeding on raw flesh. I had to come away from the factory for a few days, and the foolish servant left the room-door open, when an Imperial Eagle I had got in and tore the unfortunate Owl to pieces."

The late Mr. A. Anderson furnished me with the following note:— "I have acquired a pair of really well-marked eggs of the Dusky Horned Owl, which I took on the 28th of November last from an old nest of *Mycteria australis*, shooting one of the parent birds off the nest.

"The markings consist of indistinct lilac blotches, showing through the shell, as it were, on of course a pure white ground; and they are both *profusely* though minutely spotted, especially at the extreme end, with brown and lilac spots (or rather specks) of various shades."

These eggs measured 2·33 by 1·89 and 2·89 by 1·9.

The eggs of this bird vary surprisingly in size and shape. Typically they are a broad oval, comparatively very large for the size of the bird, but long, oval, pyriform, and nearly spherical varieties occur. I have taken a very great number of these eggs myself, and have extreme sizes of which the cubic contents of the one are fully double those of the other. In colour they are a decidedly creamy white, in texture often somewhat coarse, but withal more or less glossy. I have many specimens greatly exceeding in size the egg of *Bubo maximus* figured by Hewitson, while I have one specimen scarcely exceeding the egg of *S. stridula* which he figures.

The eggs vary from 2·2 to 2·55 inches in length, and from 1·75 to 2 inches in breadth; but the average of fifty-six eggs measured was 2·33 by 1·89 inch.

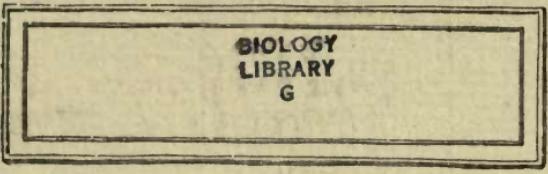
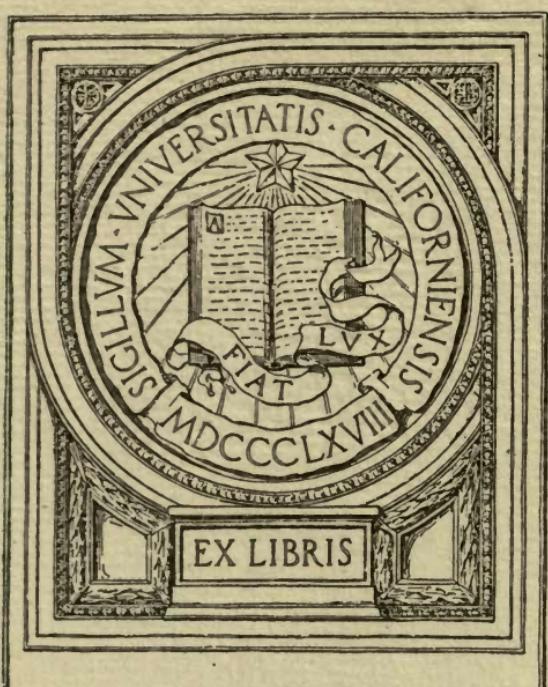
#### *Scops pennatus, Hodgs. The Indian Scops-Owl.*

*Ephialtes pennatus (Hodgs.), Jerd. B. Ind. i, p. 136.*

*Scops pennata, Hodgs., Hume, Rough Draft N. & E. no. 74.*

Of the present species, the Indian Scops-Owl (*S. pennatus*) I have never yet taken the eggs, but Mr. R. Thompson informs me that "they breed from March till August, in holes of trees, usually at no great height from the ground." He adds, "This is a common bird in our forests (Gurhwal), but I never yet took the trouble to take their eggs. Several pairs used to breed in the Botanical Gardens at Saharunpore. A pair has been breeding for three seasons in a small tree in front of the forest Bungalow at Koted-wara. Four years ago, a young one, in the rufous phase, was brought to me in the month of July."

This species, at any rate the grey form of it, occurs throughout the well-wooded portions of India and Burma (except perhaps in the Punjab, west of the Beas, from whence I have seen no specimens whether from hills or plains), so that there should be no difficulty in obtaining full particulars as to its nidification.

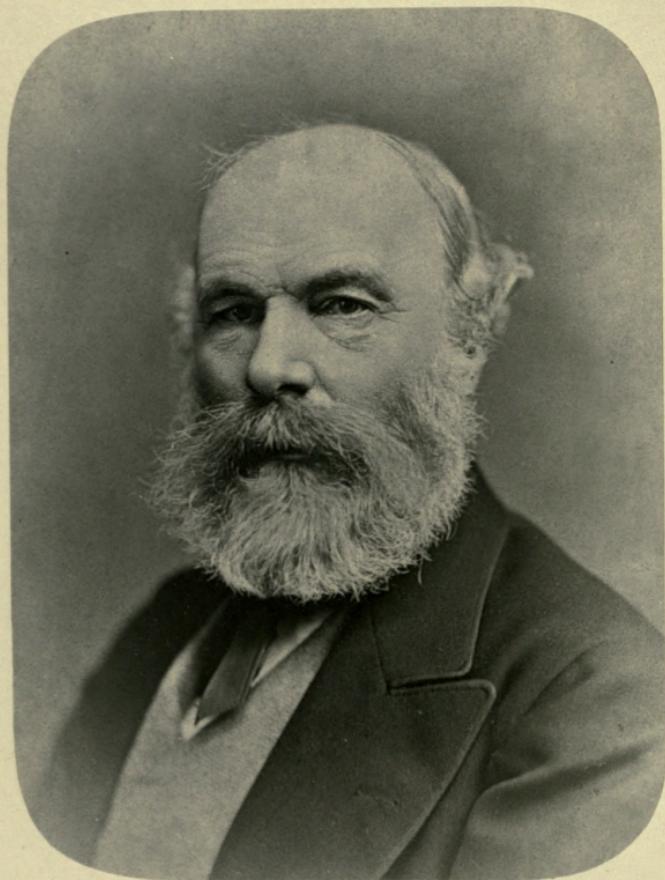






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OF  
INDIAN BIRDS.

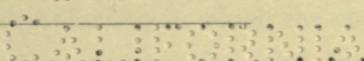
BY  
ALLAN O. HUME, C.B.

SECOND EDITION.

EDITED BY  
EUGENE WILLIAM OATES,  
AUTHOR OF 'A HANDBOOK TO THE BIRDS OF BRITISH BURMAH,' AND OF  
THE PASSERES IN 'THE FAUNA OF BRITISH INDIA.'

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VOL. III.  
WITH FOUR PORTRAITS.

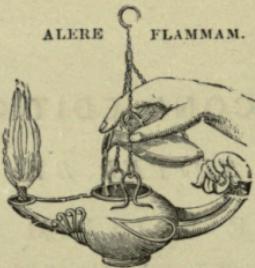


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# INDIA'S BIRDS

THE NATURAL HISTORY



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## EDITOR'S NOTE.

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MY task being completed, it is now my pleasant duty to acknowledge the kind assistance I have received in England from many friends; and I take this opportunity of including in the number those gentlemen who have also assisted me in writing the 'Birds of India,' so far as it is completed.

It is needless to say that at the Natural History Museum, South Kensington, I received the utmost assistance from Professor Flower and Dr. Günther, and the latter gentleman placed every facility for work at my disposal. It was a decided improvement to work in the well-appointed room now devoted to Birds in the new Museum instead of the uncomfortable gallery at Bloomsbury where I wrote my 'Birds of Burmah' in 1883; and I must admit that the way in which the enormous additions to the bird-collection during the past few years have been arranged and made available for study by my friend Mr. Bowdler Sharpe must impress everyone with admiration for his industry and powers of organization. Both from him and his colleague Mr. W. R. Ogilvie Grant I have always received the most friendly help on all occasions.

To the Council of the Zoological Society of London I am indebted for the generous loan of the whole of the valuable manuscript notes of Mr. Brian Hodgson, now deposited in their Library.

Among the many friends who have rendered me assistance I may specially mention Lieut. H. E. Barnes, Mr. W. T. Blanford, Colonel E. A. Butler, the Marquess Doria, Colonel H. H. Godwin-Austen, Mr. E. Hargitt, Major R. G. Wardlaw Ramsay, Count Salvadori, Mr. P. L. Sclater, Mr. H. Seebohm, Captain G. E. Shelley, and Canon Tristram.

The portraits which are issued with this volume are those of the late Marquess of Tweeddale, Mr. W. E. Brooks, Mr. Bowdler Sharpe, and Mr. W. Davison.

EUGENE W. OATES.

London, 21st August, 1890.

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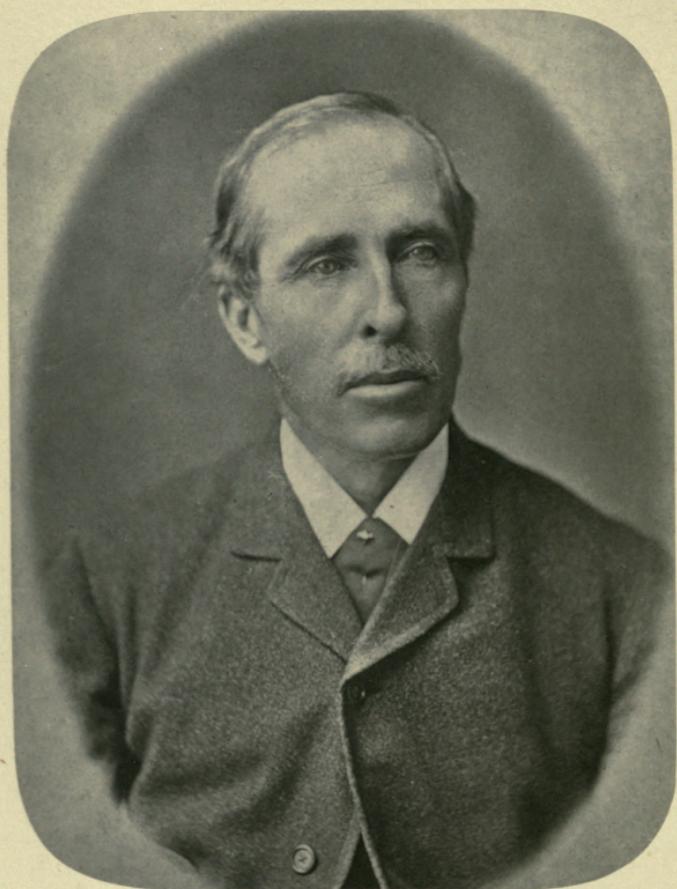
## ERRATA IN VOL. II.

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Page 67. For *The Golden Wood-Chat* read *The Golden Bush-Robin*.  
68. For *The Red-flanked Wood-Chat* read *The Red-flanked Bush-Robin*.  
,, 69. For *The Blue-headed Wood-Chat* read *The Blue-headed Robin*.  
,, 114. After *Tharrhaleus jerdoni* (Brooks) read *Jerdon's Accentor*.  
,, 212. For *Anthus sordidus*, Rüpp., read *Anthus cockburniæ*,  
Oates.  
, , For *Anthus jerdoni* (Finsch) read *Anthus similis*, Jerdon.

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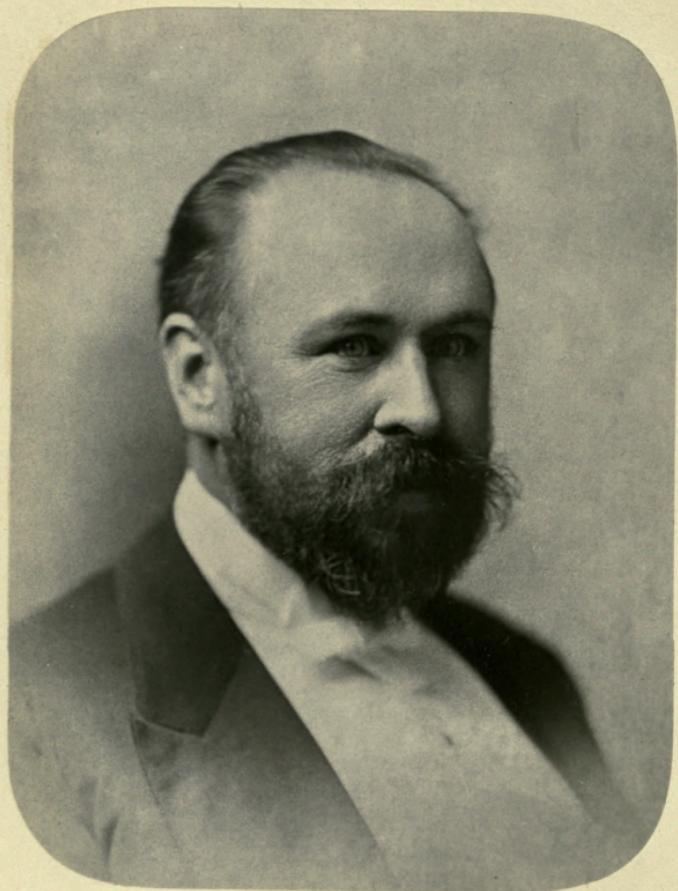


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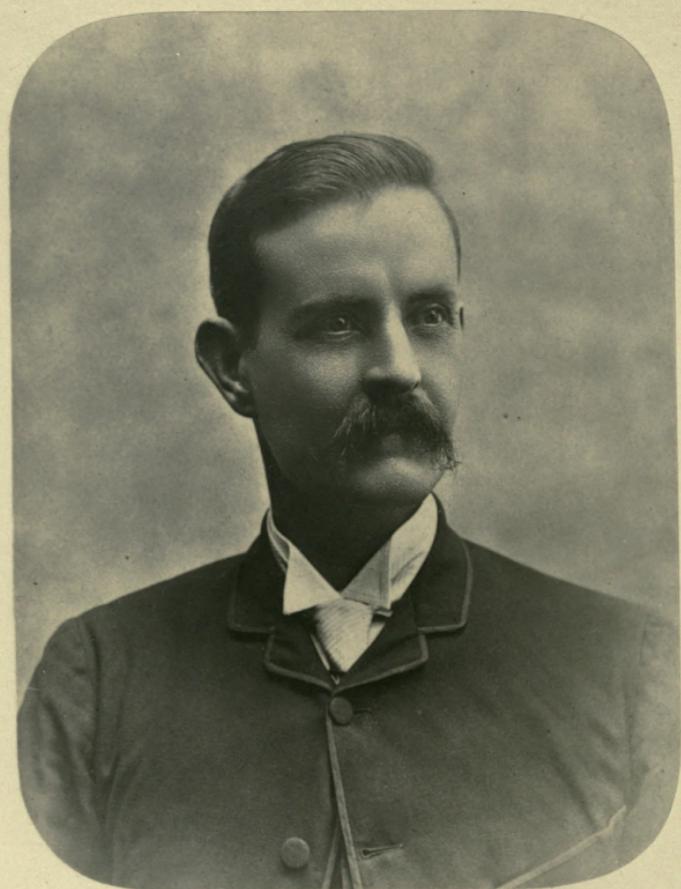
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AUGUST 1863



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WOODBURY COMPANY.

WILLIAM RUXTON DAVISON.

THE  
NESTS AND EGGS  
OF  
INDIAN BIRDS.

---

Order HALCYONES.

Family ALCEDINIDÆ.

Subfamily ALCEDININÆ.

*Alcedo bengalensis*, Gmel. *The Little Indian Kingfisher.*

*Alcedo bengalensis*, Gmel., *Jerd. B. Ind.* i, p. 230; *Hume, Rough Draft N. & E.* no. 134.

The breeding-season of the Little Indian Kingfisher seems to vary very materially according to locality. In Madras Davison found, as he considers, a nest in January; in the Nilghiris and the Deccan it lays in March. I got them in the Doon and in the Terai below Darjeeling during May, and Captain Cock obtained them in June in Cashmere. They bore a very narrow hole, rarely exceeding 2 feet in depth and often scarcely half so long, in some bank immediately overlooking water (running water by choice) at a height of from 6 inches to 5 feet above the water-level. The passage, which is barely 2 inches in diameter, terminates in a little circular domed chamber, perhaps 5 inches in diameter and 3 or 4 in height, in which the eggs, from five to seven in number, are deposited. Every nest that I have seen contained a quantity of hair-like fish-bones, and in one case the eggs reposed on a little

patch of these, but that they are there placed *as* a lining I can hardly credit, as in the majority of cases there are fewer bones under the eggs than elsewhere in the chamber and passage.

Mr. R. Thompson tells me that "in the Bhabur and Kumaon Terai this species breeds from March to May, in long narrow holes dug out by the birds on the banks of small running streams."

Captain Hutton says:—"On the 14th of June we took five semitransparent fleshy-white eggs out of a hole in the bank of a stream in the Dehra Doon."

Messrs. Davidson and Wenden remark of this bird in the Deccan:—"Fairly common and breeds. A nest taken at Satara in June."

Writing from Ahmednugger in the Deccan, Rev. H. Bruce said:—"March 15th, 1869. Found this day at Ruhuri two nests of *Alcedo bengalensis*, in one of which were six eggs and in the other five; the first nest was built in the bank of the river about 2 feet above the water; the hole was about 2 inches in diameter, dug horizontally in the sandy bank to the depth of 12 or 14 inches, and at the end of this was an excavation about 5 inches in diameter. The eggs were laid in a hollow at the bottom of this excavation; there was a layer of fragments of fish-bones upon the earth, and the eggs were laid upon this. The other nest was not more than a foot above the water-level, but in other respects similar to the first. Both nests were placed directly over the water, the first over *standing* water and the second over *running* water."

Colonel Butler writes:—"Belgaum, 22nd August, 1879. Four eggs about to hatch. The nest-hole was situated in a bank overlooking a small tank about 2 feet from the level of the water, and the eggs were deposited in a good-sized chamber on the bare ground without any nest, about a foot from the entrance of the hole.

"On the 24th August I observed either the same or another pair commencing a nest in another tank close by—the bank in which they were boring being about 7 feet high, overlooking the water and facing a public road along which people were constantly passing to and fro the whole day. There were two spots much marked by the white droppings of the old birds, near the nest, one an old root growing out of the bank, the other a projecting clod of earth, upon one of which one or other of the birds invariably sat. Upon this date, from the actions of the birds, I came to the conclusion that they were only clearing out the hole. One of the birds, presumably the hen, sat on one of the perches outside of the nest until the other arrived, when she immediately left her perch and entered the nest-hole. After a minute or two the other bird (cock presumably) left his perch and passed the hole, uttering a short shrill twitter as he flew by, upon which the hen emerged from the hole and resumed her seat on the perch till the cock returned, which was usually in about four or five minutes, during which she started down occasionally into the water below to catch

small fish. I watched this procedure for about an hour and a half, the same bird always going into the hole and coming out again as soon as the other one gave her warning of his departure. No doubt these precautions were adopted to prevent the hen bird being surprised and captured in the hole whilst excavating. On the 31st I returned to the spot about 9 A.M., and found the cock bird on his usual perch guarding the nest. After waiting for about a quarter of an hour, the hen flew out of the nest-hole and took possession of the vacant perch, and the cock flew away to some swampy ground adjoining. In a few minutes the hen flew away also, but soon returned again and commenced fishing in the water below, and as she did not seem inclined to return to the nest I came to the conclusion that she had only gone on to the nest to lay, and consequently I left the tank with the intention of returning again in two or three days' time. On the 3rd September I revisited the place, and found the cock bird as usual on duty on his perch, and after watching him for about twenty minutes he suddenly left his perch and entered the nest-hole, immediately after which both birds came out of the hole together and flew to their respective perches. The hen then left the tank, and the cock as soon as she had gone re-entered the nest-hole.

"Satisfied at last that the birds were sitting, and that the cock had gone on to the nest to sit whilst the hen was away procuring food, I walked quietly up to the bank and put a landing-net over the hole, catching him as he flew out. I then waited for upwards of an hour, intending to catch the hen also, but as she did not return, and as it was getting late in the day, I cut into the hole and secured seven beautiful fresh eggs. The nest-hole, which was about 3 feet above the level of the water, consisted of a narrow passage about 2 inches in diameter running obliquely upwards into the bank, and terminating about a foot from the entrance in a large domed chamber some 5 or 6 inches in diameter. The eggs, which were covered all over with the surrounding red soil from the birds' feet, were almost spherical, and, when washed and blown, of the purest white and very highly glossed, and deposited on the bare ground, without even a depression to lie in and no signs whatever of a nest.

"I fancy the Rains is the season at which they breed in this part of the country."

He adds:—"Breeds in the Eastern Narra, Sind, in holes of canal-banks. Mr. Doig took the eggs between 12th October and 2nd December."

Mr. Davison says:—"I took the nest of this species at Ootacamund in the last week of March. The nest was in a clay bank of a stream about 5 feet above the surface of the water. The diameter of the entrance of the tunnel was about 1.75 inch, and went straight into the bank for about 2 feet, where it terminated in a small chamber 4 inches in diameter, which contained four perfectly fresh, almost round, very glossy, pinky-white eggs. There was no attempt at a lining to the chamber beyond the few odd scraps of

small minnow-bones. I once found what may have been intended for a nest in Madras towards the latter end of January, in a well; what I supposed to be the nest was placed in a hole in the masonry lining of the well, and round the entrance of the hole was accumulated a rather large quantity of small partially decayed fish and fish-bones; but these had been placed there apparently not as a lining, but with the object of keeping the eggs in the hole, as it was one left when the scaffolding was removed, and consequently had a perfectly flat floor. I should, however, add that though the bird was in the hole, it contained no eggs, and *may* therefore have been only a resting-place."

Mr. J. Darling, Junior, says:—"I found a nest of this bird at Neddiwuttum on the Nilghiris, at about 6000 feet above the sea, on the 19th April, 1870. The nest was in the bank of a large stream, about 2 feet from the water, a circular passage 4 inches in diameter and 2 feet deep, terminating in a chamber about 8 inches by 4. There were a few fish-bones scattered about, and plenty of decaying insects and small fish, making a fearful stench. There were six quite fresh eggs. In Wynnaad they breed plentifully from March to May. I have unfortunately always got young ones down here."

Writing from Burma, Major Wardlaw Ramsay remarks:—"I found a nest in the side of an old well in some thick jungle near Rangoon, at about 5 feet from the surface; it contained seven eggs."

Colonel Legge writes, in his 'Birds of Ceylon':—"In South, West, and Central Ceylon the breeding-season of this species is from February until June, but in the north I have known it to nest in November."

The eggs are exquisitely glossy, and, when blown, china-white, little ovals, or, some few of them, almost spherical. They are very like those of *Merops viridis*, but more glossy, and, as a rule, somewhat less round. When unblown, they are pinky white.

In length they vary from 0·75 to 0·87 inch, and in breadth from 0·65 to 0·72 inch; but the average, yielded by a large series of measurements, is 0·8 by 0·68 inch.

### **Alcedo grandis, Blyth. *The Great Indian Kingfisher.***

*Alcedo euryzona, Temm., Jerd. B. Ind. i, p. 231.*

*Alcedo grandis, Blyth, Hume, Cat. no. 135.*

A correspondent of the 'Asian,' apparently writing from the north-east part of the Empire under the name of "Rekab," says:—

"I have taken only two nests of this bird, and one other I have had shown me after the eggs and hen bird had been taken and brought to me. All three nests were placed, as is usual, at the end of a tunnel dug in the earth by the bird itself. In one the nest was placed in a chamber at the end of a burrow scarce a foot deep, and in another case the burrow was hardly two feet; but

in both instances the excavation had been in extremely hard clayey soil ; the third, which was made in soft, sandy soil, was nearly six feet deep. In every case the nest was made of fish-bones ; but in one nest a little moss had also been put down over the bones. On both occasions on which I took the nest, it emitted a very strong stench on being opened out to the air. Of the three nest-holes, two were dug in deep ravines through which a little water trickled during the rains, the banks were densely covered with forest, and no sunshine could penetrate at any time of the day ; the third hole was made amongst the roots of a tree growing on the steep slope of a hill-side and amongst extremely close bamboo jungle. The entrance to the hole was so placed as to be in deep shade throughout the day. The tunnels are made sloping upwards towards the chamber, so that no water can possibly penetrate to it.

"The eggs are from two to six in number and are not shaped an absolute round. In the first clutch I took, or rather had brought to me, the shape was not particularly noticeable ; but in the second clutch the eggs were of a short but most distinct oval. This may prove to have been an exceptionally shaped lot ; but I shall have to wait another year or so before I can say for certain.

"The eggs are, of course, white and very highly glossed.

"The three nests were taken on the 14th, 17th, and 21st of April, 1889. On the 14th and 21st the hen bird was captured on the nest, in one case by hand and in the other by a noose placed at the entrance ; in the third the hen bird was shot by myself whilst leaving the nest ; and on the same day a male, presumably the mate, was shot lower down in the same ravine.

"In May 1888 I had some young birds of this species, which were the first I had seen, brought to me ; they were then fully fledged and ready to fly.

"This Kingfisher is one of the rarest, if not the rarest, of those to be found on the continent of India, and its extremely shy habits make it even more difficult to obtain, whilst observation of its habits can only be obtained by chance. It keeps to nullahs and ravines in the densest evergreen jungle, and appears to feed on fish, tadpoles, and the larger insects. Only once have I been able to observe it feeding, and that was in December, 1888, when I for some time watched a male bird that was fishing in a small rivulet running through steep and well-wooded banks. Its actions appeared to be much the same as those of *Alcedo bengalensis* ; but, unlike that bird, it always returned to its perch after an attempt, successful or otherwise, to take a fish, whereas the little *A. bengalensis* seems always to 'move on.' Whilst I was looking on he caught some half dozen fish, mostly very small ones ; but one was, I should say, nearly three inches long, and which he only swallowed with some difficulty, tossing his head up and jerking the fish about until he got it properly fixed head downwards ; the smaller fry seemed to be swallowed at once irrespective of their

positions. The bird seemed to be successful at taking a fish not more than once in every six or seven attempts. I often wondered at people talking of the wonderful accuracy with which Kingfishers dive after fish. I have often had the curiosity to count their attempts, successful and otherwise, and my experience goes to show that *A. bengalensis* is the most expert and that *Ceryle rudis*, about which people talk most, is the least accurate. I have seen him fail twenty-three times running.

“The plumage of *A. grandis* presents a most striking contrast when seen in sunlight and in shade. In the former the bird appears to be glistening blue alone, whilst, when in shadow, the whole bird looks a sombre black.

“It is a very silent bird ; its note, like that of the Indian Kingfisher, but softer, is only heard when the bird is on the wing, and then very rarely, as it usually gives one cry just after starting, and then relapses in silence. Its flight is exceedingly rapid, and, like all Kingfishers, this bird appears to lean from side to side in flying ; before perching it always flies *upwards*, not *down*, to the intended place.”

**Alcedo asiatica**, Swains. *The Malayan Kingfisher.*

*Alcedo meningting*, *Horsf.*, *Hume*, *Cat.* no. 135 ter.

*Alcedo beavani*, *Wald.*, *Hume*, *Cat.* no. 135 quat.

Mr. Oates, writing from Pegu, records the following note regarding this beautiful Kingfisher :—“July 2nd ; nest in the steep bank of a ravine in thick forest. Gallery about one and a half feet long, terminating in a small chamber. Eggs four, laid on the bare soil ; very glossy and round, white ; size .78 by .69, .76 by .7, .75 by .7, and .8 by .68. July 14th ; nest with nearly full-grown young in similar situation.”

**Ceryle guttata** (Vigors). *The Pied Himalayan Kingfisher.*

*Ceryle guttata* (*Vig.*), *Jerd. B. Ind.* i, p. 234 ; *Hume, Rough Draft N. & E.* no. 137.

The Pied Himalayan Kingfisher breeds undoubtedly in the banks of all the larger streams of the Sub-Himalayan ranges, but I have only once succeeded in meeting with a nest, and that was in June in a stream below Subatoo, and it unfortunately contained four young birds. It was a large hole fully 4 inches in diameter, ran about 18 inches into the bank of loose decomposed shale, and terminated in a chamber containing a quantity of fish-bones and grass, fully 10 inches in diameter. Mr. R. Thompson tells me :—“The large Pied Kingfisher breeds from April to June in the banks of the larger well-wooded streams, frequently in the deepest parts of forests. Sometimes and more commonly they breed in holes dug out by themselves, at others they suit themselves to ledges and shelves of rocks ! Three or four is the usual number of

young ones. The old birds may often be seen carrying fishes from 6 to 7 inches in length to feed the young ones with. The fish are always swallowed whole."

Mr. J. Inglis writes from Cachar :—" This large Pied Kingfisher is only to be found in the mountain rivers or streams. I have not observed a single bird near stagnant or slow-running water; it is seen nearly always in pairs. Breeds in March."

A correspondent of the 'Asian,' apparently writing from Cachar, and signing himself " Rekab," says :—

" As I have only taken one nest of this bird, I describe that in detail, others are sure to resemble it very closely. It was placed at the end of a hole excavated in a high bank, and placed at about three feet from the top and fully twenty feet above the level of the water. The tunnel, independent of the chamber at the end, was only about two feet deep; and as the soil was of a very loose, sandy nature, and quite without stones or pebbles of any kind, this would seem to show that this bird is not in the habit of burrowing to any great depth. *A. bengalensis* or *Ceyx tridactyla* would have made a tunnel fully six feet deep in such a place. The chamber, which was a very large one, was raised high above the entrance, the latter being fully eight inches below it. The nest was a mass of malodorous fish-bones, some of which were of considerable size, and had probably belonged to fish nearly six inches long. It was hollow in the middle, the material of the nest being raised some way up the wall of the chamber on three sides. The eggs were four in number, white and round and of great size.

" The Cacharis tell me that, as a rule, it only lays two or three eggs, commencing to breed in May, but that this depends a good deal on the rains being early or late as they may happen to break. The nest taken by me was found late in July, and the eggs were very hard-set. The river, in the bank of which the nest was, was large enough to admit of small boats navigating it all the year round.

" This bird is exceedingly common on all large hill-streams up to a height of about 2000 feet; above that it is not often met with, though on one or two occasions I have seen it flying about small streams at a height of nearly 4000 feet. I think that it ascends during the breeding-season higher than at other times, for in the cold weather it is fairly common in the plains of Cachar; but during the three rainy seasons I have been on a visit to that district I have only seen one bird.

" They appear to be entirely fish-eaters, and are never seen away from water.

" Whilst waiting for fish they perch very low down amongst the scrubby bushing overhanging the edge of the water, and instead of selecting a twig or bough on the outside of the bush, they get as far inside as possible; their love of shade and darkness of course leads them in like manner to always keep the shady side of the stream. They are generally found in pairs and keep within hail of one another. When frightened they fly but a short

distance, speedily resettling, unless the banks are very bare, when they continue their flight to the nearest convenient clump of shrubs. Their manner of taking prey from the water is by swooping down obliquely towards it, continuing their flight and not returning to their original perch. Occasionally they hover in the air when they are attracted by something in the water, and drop almost perpendicularly into it; in such cases, however, they never dive to any depth, seldom immersing more than their head and neck.

“ Their usual cry is much like that of all Kingfishers, but very loud, and uttered in a very quick succession of notes. Besides this cry it gives a low hoarse croak from time to time when seated in deep shadow, and this is, I think, the common call to its mate; at all events, when two birds are fishing in company and one of them utters this sound, the other bird always answers it. It is not a noisy bird on the whole.

“ Its flight is extremely strong, and it is capable of going at great speed; but when not frightened or otherwise hurried, it seems to content itself with a sort of half-power speed, and goes along very lazily, slowly flapping its wings.

“ This bird is the last of the Kingfishers to retire to roost at night. I have sometimes seen it flitting about when it had become quite dusk. In flying at any distance the whole bird presents a grey appearance, merely the head appearing black from the feathers laying down close to the head. This crest can be raised by the bird at will, and when uttering the croak above mentioned it raises and depresses it two or three times with each cry.

“ This bird, when it is successful in taking a fish too big to swallow at once, often has to give up its capture to *Haliaëtus fulviventer*, which is a frequenter of the same streams as it haunts itself, and which is much given to living on other people and by other people's exertions, always preferring ready-caught fish to the trouble of hunting for them itself. The eagle, on swooping down, utters a loud vibrating cry, and, on hearing this, *Ceryle* drops the fish without the slightest hesitation, and, accelerating his speed, seeks safety for himself in the nearest cover.

“ As may be imagined, the shadow of any large eagle or hawk flying overhead is enough to reduce this bird to absolute silence; the other Kingfishers appear, however, not to mind at all.”

***Ceryle rudis* (Linn.). *The Pied Kingfisher.***

*Ceryle rudis* (Linn.), *Jerd. B. Ind.* i, p. 232; *Hume, Rough Draft N. & E.* no. 136.

The Pied Kingfisher breeds everywhere throughout the plains of India, and invariably, I think, in holes of banks overlooking running water, and, as a rule, in those of our larger rivers. It is

rare to find a nest anywhere except from 1 to 5 feet above the water-level of some perpendicular earthen cliff, going down straight into the water. Nine times out of ten the nest-hole can only be got at from a boat.

They lay, I know, from the latter end of January to the commencement of April; but I suspect they also lay towards the end of the rains, for Mr. R. M. Adam "found a nest, October 30th, 1866, in a cliff about 18 feet high overhanging the Jumna. The hole was about  $4\frac{1}{2}$  feet above water-level, and ran for about 7 feet into the cliff. It contained four young birds able to fly."

The depth of the nest-hole varies according to the nature of the soil, extending to 4 or 5 feet where this is friable and sandy, and scarcely exceeding a foot in stiff clayey banks. Usually the burrow is quite horizontal and about 3 inches in diameter, and terminates in a chamber some 6 or 7 inches across, in which fish-bones and grass may be found strewed thinly about, but in which I have never seen any approach to a real nest.

Six is the greatest number of eggs I ever saw taken out of a nest, but it is quite common to meet with four or five hard-set eggs in a nest.

Mr. F. R. Blewitt remarks:—"This species breeds from February to probably the middle of April. For its nest it makes a moderately-sized circular hole, extending from 4 to 5 feet in the high clay or sand-bank of a stream or river. At the termination the hole is slightly enlarged for the better reception of the sitting birds. The eggs are simply deposited on the sand. On two occasions I witnessed the birds constructing the hole or nest; they alternately relieved each other at the work, and when tired sat together some short distance off on the opposite bank for a few minutes. On the 8th February last, near Bamah (Raepore District), in the high bank of the Mahanuddee, I found a nest with three fresh eggs, securing with them the parent birds. The length of the hole was about 5 feet. The next day I discovered another nest in the clay bank of a narrow but deep streamlet, with two fresh eggs. The length of the hole was about 3·5 feet.

"From personal experience I cannot affirm what may be the maximum number of the eggs, but last year (in, I think, March) my men found six young birds in a nest in the bank of a small stream. Of *Alcedo bengalensis*, they found, in the Saugor District, seven unfledged young in a nest."

Mr. Brooks writes:—"I have found the nest of this bird frequently in the banks of the Tonse and Ganges. The nest is about 3 feet in the bank, and some 2 or 3 feet above the water-level, and the hole by which the bird enters is about 2 inches in diameter."

Colonel G. Marshall says:—"This bird is very common in the Saharunpore District; it breeds in the usual places, holes in banks, and lays four shining white eggs. In this part of the country it breeds in March, and the young are hatched early in April.

"I imagine the young birds live with their parents some time

after they are fledged, since late in the season I have noticed six or seven of them coming out of a single hole.

"I have noticed a curious fact about this bird ; it is a gregarious breeder. I have taken three sets of eggs from the same hole ; the hole led to a large open sort of cavern about 3 feet across, which was plentifully strewn with grass and rubbish, and the eggs were in different corners of it."

Major Bingham remarks :—Breeds in March both at Allahabad and at Delhi."

Messrs. Davidson and Wenden, writing from the Deccan, say :— "Common. Apparently breeds at all seasons, except the very hot months."

Mr. Benjamin Aitken sends me the following note :—"At Akola, Berar, in either the end of January or the beginning of February, 1870, my brother took two out of six eggs from a Pied Kingfisher's nest in a river-bank, about two feet above the surface of the water. Although the hole was much dug away, the birds continued to sit upon the remaining four eggs, which were duly hatched, and soon after the young were fledged the parent birds took possession of another hole near the first. That bank seemed to be their regular breeding-place and was full of holes. Six eggs were again laid, and six young birds, looking exceedingly fresh and pretty, appeared in due time perched all in a row upon the top of the bank. Nearly a mile down the river there was a *bund*, and here of course it was easier to catch fish than at the nest where the water was running. So from early morning till late at night the parent birds continued making trips to get food for their young. Each little fish that was brought cost a flight to the bund and back of not much less than two miles, and the voracious fledglings seemed never to be satisfied. As soon, therefore, as the latter were able to go the distance, they were conducted to the bund, where they could be fed with less trouble to the old birds and, I don't doubt, more satisfaction to themselves. This arrangement was continued for several weeks, the whole family repairing to the bund every morning, and flying back to the nest in the evening. I regret I never took the trouble to watch whether they got into the hole to sleep, or took up their positions for the night on the rocks and bushes on the river's bank."

Colonel Legge found this species breeding in Ceylon in March. Its nest-hole was excavated in the earthy banks of the Gindurah.

Mr. Cripps writes from Furreedpore in Bengal :—"Excessively common. A very cheery bird, always on the move. Nests in holes excavated by themselves in river-banks. Length of gallery from  $1\frac{1}{2}$  to 4 feet ; no lining to egg-chamber. I have taken a clutch of 5 eggs (fresh) on the 26th October, 1877, and found a solitary half-grown young one in another nest, on the same date ; the last nest of the season was secured on the 1st March, 1878, with two hard-set eggs and two callow young. These birds stick more to the large rivers, although there may be beels and tanks near."

Mr. J. Inglis remarks from Cachar:—"The Pied Kingfisher is very common throughout the district; it always fishes on the wing. It breeds here about March."

Mr. Oates, writing from Pegu, tells us:—"In Lower Pegu eggs may be taken during the latter half of October and first half of November. Eggs generally five."

The eggs are typically very broad ovals, at times nearly spherical; not unfrequently, however, they are curiously pointed towards one end.

When blown they are a pure china-white and have a high gloss.

In length they vary from 1.12 to 1.25 inch, and in breadth from 0.9 to 1 inch, but they average about 1.18 by 0.94 inch.

**Pelargopsis gurial (Pears.). *The Indian Stork-billed Kingfisher.***

*Halcyon leucocephalus (Gmel.),* *Jerd. B. Ind.* i, p. 222.

*Pelargopsis gurial (Pears.),* *Hume, Rough Draft N. & E.* no. 127.

Mr. R. Thompson says that this species, the Indian Stork-billed Kingfisher, breeds from April to June, laying in a deep hole excavated by the birds in banks of streams and rivers. He adds:—"I found in May 1867 a nest containing five young ones. Near the inhabited nest were seven others, all deserted, and from the débris and marks left each evidently had served its turn as a breeding-place and had been discarded for a fresh one the following year. Found on all minor clear running streams of the Lower Himalayas."

Mr. W. Theobald makes the following remarks on the breeding of this bird in Monghyr:—"Lays in the fourth week of June. Eggs four in number, round, with some minor combinations; size 1.09 by 1.02 inch; colour pure white; gallery, 1 foot in depth, in a steep bank, in jungle."

Mr. J. R. Cripps writes from Assam:—"April 27th, 1880. Borbam Tea-garden, Dibrughur. Found four fresh eggs. On the borders of the tea-cultivation and alongside of heavy forest, a large dead tree had been blown down amongst the tea-bushes; there was a deal of earth clinging to the roots of this tree, and in this earth a hole had been excavated by the birds. The tunnel was 18 inches in length by 3 inches in height, and 3½ in breadth. The egg-chamber was slightly larger than the passage leading to it. Under the eggs were pieces of fish-bones, crab-shells, and the wings and heads of some kinds of hard-shelled insects. No river or tank was within half a mile of the place. On the 22nd August last, I saw another of these birds fly, with a fish in its mouth, into a hole in a dead and rotten chumpa tree, about 15 feet off the ground. This tree was about 100 yards from the one above mentioned and was in the garden. I had it cut down, but the wood was so decayed that the trunk went to shivers, destroying the young and all chance of measuring &c. the hole." These four eggs measure 1.18 by 1.06, 1.10 by 0.99, 1.21 by 1.08, and 1.2 by 1.08.

Herr Otto Möller, writing from Sikkim, says:—"I have only succeeded in getting two nests of this bird, which, however, is very common in the Terai; the first, containing 3 fresh eggs, was found by my brother, Mr. F. A. Möller, in 1875 (no date). On the 5th May, 1878, one of my coolies brought me 3 fresh eggs together with the female bird, which he had dug out of the sandy bank of a stream. As I had no time to skin the bird the same night, I put her in a cage, where she during the night laid one egg more, which unfortunately got broken by her flapping. I send you these three eggs: the first three found measure 1·53 by 1·31, 1·50 by 1·26, and 1·52 by 1·28."

Colonel Legge informs us that in Ceylon this species "breeds in secluded spots, excavating a deep hole in the side of a river-bank or in the bund of a tank beneath shady trees. The nesting-time in Ceylon is during the first three or four months in the year."

The eggs of this species sent by Herr Otto Möller are large and very broad ovals, almost spherical but that towards one end they are somewhat pinched out and have a tendency to form an obtuse point there. The shell is pure white and has a considerable amount of gloss, but seems from the specimens sent to have a tendency to exhibit numerous small pimples or rugosities chiefly towards the blunter or more obtuse end.

The eggs of this species, like that of *P. burmanica*, appear to be extremely small for the size of the bird, being in fact no larger than those of *Halcyon smyrniensis*; indeed, had I not received them on good authority I should have hesitated to have accepted them as belonging to this large species. Like the eggs of the rest of the family, they are very round, pure white, and have a fine gloss.

***Pelargopsis burmanica*, Sharpe. *The Burmese Stork-billed Kingfisher.***

*Pelargopsis burmanica*, Sharpe, Hume, Cat. no. 127 bis.

Major C. T. Bingham writes from Tenasserim:—"I am rather diffident about writing a note on the finding of the eggs of this bird, as they were found by myself personally in a made nest in the fork of a bamboo growing near the bank of a choung, a thing contrary to the habits of all Kingfishers. Moreover, though I fired at the bird as she flew off the nest, I missed her. In my own mind there is not a ghost of a doubt that the eggs in question belong to the above species, as I had a close look at the bird, as she sat on the nest, with a pair of binoculars, at not more than 15 yards distance. The nest was, as I have already said, placed in the fork of a bamboo near water. It was a loosely constructed shallow cup of rough grass-roots, wholly unlined, at a height of about 4 feet from the ground. The eggs, three in number, are broad ovals, and glossy white in colour. They were found on the 10th April."

The eggs are very round ovals, pure white and very glossy.

They measure  $1\cdot16 \times 1\cdot0$ ,  $1\cdot13 \times 0\cdot99$ ,  $1\cdot2 \times 0\cdot98$ . They are too small for *Coracias indica*, and *à fortiori* for *Eurystomus orientalis*, but I have not a sufficient series of eggs of *C. affinis* to assert that they *might* not have belonged to that species. But then *C. affinis* no more builds a nest such as Major Bingham describes, than do the ordinary run of Kingfishers. Again, *Nyctiornis athertoni*, the only other bird that I know that occurs in this locality, that could I should have thought possibly have laid these eggs, also breeds in holes in trees.

They are not pigeons' or doves' eggs—that is certain; they belong to the bee-eater, roller, or kingfisher groups, and, incredible as it may at first sight appear, I incline to believe that the eggs really are those of *P. burmanica*. No doubt some birds do at times go and sit upon other birds' nests, which they find unprotected by the real owners, but I never heard of a Kingfisher doing this, and Major Bingham could not have been mistaken in the birds, which he knows well.

The circumstance borders on the marvellous, but I think it cannot be rejected.

Major Bingham subsequently found the nest of this Kingfisher in holes of banks. He says:—"It breeds in the Thoungyeen in the latter end of February, in March, and in the beginning of April, commencing and finishing the digging of its nest-hole long before the eggs are laid.

"On the 23rd March, being encamped just on the bank of the Meplay close to its mouth, I noticed, while seated outside my tent in the afternoon, a pair of these birds going in and out of a hole in the bank opposite. On inspecting it closer, it proved to be the opening to a tunnel  $1\frac{1}{2}$  inch in diameter, and going in for fully five feet, where it ended in a rounded chamber, somewhat larger than the passage, in which lay four roundish glossy white eggs. There was no lining of any kind, the eggs reposing on the bare ground.

"They measure respectively  $1\cdot19$  by  $1\cdot05$ ,  $1\cdot17$  by  $1\cdot03$ ,  $1\cdot18$  by  $1\cdot08$ , and  $1\cdot15$  by  $1\cdot03$ ."

The eggs are of the usual type, small perhaps for the size of the bird, being little if anything larger than those of *Halcyon smyrnensis*, very broad ovals, in some specimens quite spherical, puer white and very glossy.

### Subfamily DACELOININÆ.

*Ceyx tridactyla* (Pall.). *The Three-toed Kingfisher.*

*Ceyx tridactyla* (Pall.), *Jerd. B. Ind.* i, p. 229; *Hume, Cat.* no. 133.

Writing from north-west Ceylon Mr. H. Parker says:—"It should be noted that the eggs of this bird are quite unlike those of other Kingfishers. They have well-marked small ends and are also somewhat pointed at the other end. The shells are of very

fine texture and are excessively fragile ; they have a decidedly pink appearance before being prepared, and afterwards do not assume the opaque white of other eggs. The bird breeds in dense forest or jungle far from water, in the banks of dry streamlets, the months being April, July, and August I believe, and probably also May."

A correspondent of the 'Asian,' apparently writing from the north-east part of the Empire and signing himself "Rekab," says of this species :—

"The eggs are laid in a hollow at the end of a burrow on a nest formed of a few small fish-bones, one or two leaves, and perhaps a scrap or two of moss. The chamber is rather larger for the size of the bird, and the tunnel also is larger in proportion than that made by other Kingfishers. It is wonderful the rapidity with which this tiny bird makes its burrow, when the soil is fairly soft and there are no pebbles to hinder it. I was once a spectator on such an occasion, and, seated in a boat in the middle of the river, I watched the pair of birds working for about half an hour. When I first arrived about three inches of excavation had been made, and the bird was able to throw out the sand behind it as it proceeded with its work ; but, getting deeper in, it had, every two or three minutes, to work its way out backwards, pushing the loose sand out behind it. Its action in digging and in throwing out the sand behind it was exactly like that of a dog burrowing, and the force used was very considerable, and until the burrow was some six inches deep the sand flew out in a regular shower. I did not see it use its bill except to loosen the soil, all the removing being done by the feet. The birds relieved one another every eight or ten minutes.

"In the half-hour, or at the longest the forty minutes, that I was present some ten inches of hole had been prepared, and when I returned a fortnight afterwards three eggs had already been laid.

"This was the only occasion on which I have known this bird to select the bank of an open river for purposes of nidification. As a rule it breeds in nullahs or small streams running through forest.

"The eggs are four to six or even seven in number and pure white. According to my experience they, though not *pointed* like those taken by Mr. Parker in Ceylon, are less round than the eggs of *Alcedo* ; they are, of course, very small.

"This lively little bird frequents both forest-streams and nullahs, and the larger and more open hill-rivers ; but it generally forsakes the latter entirely during the breeding-season, from May until August.

"It is not at all a shy bird, and will allow close, if quiet, observation ; but I have noticed little about it calling for particular mention. As far as I have been able to ascertain, it is entirely a fish-eater, though it may also devour water-insects, small prawns, &c. I have never seen any remains of insects in its stomach.

"Its cry is a shrill piping note uttered, whilst flying from one perch to the other, at longish intervals. I have not noticed it make any noise whilst perching. Its flight is very swift, and the changes of the appearance in its plumage are exceedingly beautiful.

"My notes give the 25th of May as the earliest date on which I have taken its eggs. Most were taken in July, and some well on into August, the 12th of that month, in 1887, being the latest I have recorded."

**Halcyon smyrnensis (Linn.). *The White-breasted Kingfisher.***

*Halcyon fuscus (Bodd.)*, *Jerd. B. Ind.* i, p. 224.

*Halcyon smyrnensis (Linn.)*, *Hume, Rough Draft N. & E.* no. 129.

The White-breasted Kingfisher breeds all over the country from March to July. It lays from four to seven eggs, five being the normal number, in a hole which it excavates for itself, and which varies in length from little over 1 to more than 3 feet, although, as a rule, it does not exceed a couple. This hole is from  $2\frac{1}{2}$  to 3 inches in diameter, and terminates in a chamber some 4 inches in height and 8 in diameter. I have never found any nest, so to speak, but both the passage and chamber often contain remains of frogs, mole-crickets, and the like.

The nest-holes are commonly pierced in banks of tanks and canals, or streams, or pretty high up in cliffs overlooking rivers, but the interior of wells is not at all an uncommon situation, and in Rajpootana I had six eggs brought up to me from a nest-hole situated nearly 100 feet below the surface of the country! The reason for the birds going to such an extraordinary depth appeared to be that the upper 90 odd feet passed through very loose soil, where the well was lined with masonry, and it had to go below this to pierce a hole. I have also taken the nest (and here the hole was barely 18 inches deep) out of the mud bastion of an old native fort, some 20 feet above the level of the water in the moat, and again in an old mud wall of a deserted house far away in the jungle.

Mr. W. Theobald makes the following remarks on the breeding of this bird in Mergui:—"Lays in the fourth week of March: eggs five in number; blunt oval; size 1.20 by 1.03 inch; colour pure white: gallery  $1\frac{1}{2}$  foot, in a stiff bank near a road."

Mr. W. Blewitt writes:—"I took the eggs of this bird in the neighbourhood of Hansie on the 28th June and 4th and 18th of July. They were laid in holes excavated in the canal-bank without any lining or nest. In one nest-hole I found three, in each of the others four eggs, and one of the latter sets were fully incubated."

Colonel G. F. L. Marshall, when at Saharunpoor, sent me the following note:—"The eggs are laid in the latter half of April and the beginning of May; the young are hatched towards the end of May. Domestic arrangements are commenced early in April.

"The eggs are laid in holes in the ground. All that I have taken have been without exception out of the perpendicular banks of the canal. The hole is about 3 inches in diameter at the orifice, and generally slopes upward; it seldom goes more than two and a half feet into the bank, and often not more than 15 inches; the egg receptacle is merely a hollow in the earth where the hole terminates, and has no lining of any description; it is about 9 inches wide.

"The eggs, sometimes four, generally five, in number, are of a shining polished white without spot."

Writing from the Sambhur Lake, Mr. R. M. Adam tells us:—"The White-breasted Kingfisher is very common, and breeds in the banks of the open wells from March till June. On the 15th April, I took a nest 4 feet below the ground-level, and 3 feet deep, in which I found two fresh eggs. On the 13th June, I took another nest in which I found five eggs, all hard-set; the nest was about 18 inches deep. On the 27th June, I took a nest with four fresh eggs. The unblown eggs were pinkish with whitish streaks. In no case had the egg-cavity any lining."

Captain Burgess records that "this Kingfisher is one of the most common of its tribe in the Deccan, frequenting almost every stream and nullah. It breeds during the month of May, in holes of the banks of rivers, laying as many as seven eggs, of a beautiful pinky tinge, owing to the colour of the yolk showing through the thin delicate shell." From Ceylon Mr. Layard notes (but this, like most of his notes on nidification, requires verification) "that the nest of this species is found in decaying trees; the parent bird deposits two white eggs (axis 15 lines, diameter 13 lines), beautifully smooth and shining. I have procured eggs in the north of the island in December, in the south in April."

Writing from Sind, Colonel Butler says:—"Kurrachee, 7th May, 1877. Found a nest of the White-breasted Kingfisher containing five fresh eggs. The nest consisted of a round hole about  $3\frac{1}{2}$  or 4 inches in diameter, bored in the perpendicular bank of a well about 10 feet from the level of the ground. The passage was about 2 feet in length, and terminated in a small chamber in which the eggs were deposited upon the bare ground.

"During the last ten days of July 1878, two or three nests were found by our men in holes in canal-banks in the E. Narra containing 4 or 5 fresh eggs each; also other nests later on, in August."

Major C. T. Bingham remarks:—"At Allahabad this bird was decidedly rare. At Delhi it abounds, and there only I have taken its nests, or rather eggs, for nests there are none."

Messrs. Davidson and Wenden, writing from the Deccan, say:—"Very abundant. Breeds in March and April."

Mr. F. W. Bourdillon, writing from Travancore, says:—"Common among the small patches of paddy cultivation and on the banks of the larger streams at the foot of the hills, but never ascending to any height. The female lays from 4 to 6 round white eggs, about the beginning of April, in a hole in a bank."

Colonel Legge says:—"In the west and south of Ceylon this species breeds from January till April, and in the north I have found its nest as late as July."

A correspondent of the 'Asian' writes, probably from Cachar, under the name of "Rekab":—"First of course may be mentioned the fact that it sometimes breeds, as do other Kingfishers, by making a hole in a bank as a receptacle for the eggs. Even in this case it places in the chamber at the end of the shaft a quantity of moss, neither making a nest of bones, as do some of this family, nor depositing them on a few leaves or the bare soil, as is the usual custom. It has, however, another and, at least as far as their bills are concerned, a far more general habit of building a nest for itself, which may be said to roughly resemble a large untidy edition of an English Wren's place of abode.

"The first time I found this out was by having some Kingfisher's eggs brought to me by a native, who said that he had taken them from a moss nest built amongst the overhanging roots of a tree growing at the side of a nullah. Some time after, more eggs were brought, and the description given of the nest was the same; but as on this occasion I went with the man to the nullah from which the nest was said to have been taken and we could find no trace of it, so I concluded he had only been lying. The native, a Bachari, was, however, very positive in his assertions, and went away swearing at my incredulity. Within a few days—three, I think—he came back with two newly laid eggs, a quantity of moss, and a hen Kingfisher of this species alive in a basket. In this case he had found the nest imbedded in a hollow in a rock and, setting a noose for the parent bird, had, on catching it, brought it to me, together with the remnants of the nest and the two eggs. A rupee extracted a promise from him that he would leave the next-nest he found untouched until I could go myself and make a personal inspection of it. Before this, however, I was fortunate enough to find one for myself whilst out shooting. I was creeping down a deep nullah, along the bottom of which a little water was trickling, and making a false step I splashed into a little pool, the noise frightening a Kingfisher, which flew from the bank close to my head, and looking up I saw the nest—a mass of moss, of a large oval in shape, wedged into a hollow between two stones, covered at the top with another, and supported underneath by a projecting root. It contained four eggs, which I took; but the nest fell to bits on being removed, and appeared to be merely a lot of moss pushed into the hollow and then roughly fashioned into a hollow oval. The next year a pair of these birds were seen to frequent a nullah running near a camping house where I was then halting. On some natives and myself searching about, one of the former discovered a nest just commenced to be built in a hollow, caused by a large oval stone, which had been previously half imbedded in the earth, falling out. Dismissing my men, I seated myself on the opposite bank about twenty-five or thirty yards off—seating myself behind a bush so that, as long as I

remained quiet, I should not be noticed, and had at the same time the nest within full view. Taking out a pair of opera-glasses, which I find most useful for this kind of work, I had not long to wait before one of the birds came back, and, after taking a good look at the nest, he went away again and returned in a few minutes with a mass of wet moss in his bill; clinging to the edge of the hole it commenced forcing this moss into that already placed at the base of the hollow, pushing it with the point and pressing it with the sides of the bill, and seeming to use all the force it was capable of. I could see no attempt at fastening the moss together or of intertwining it in any way, and this nest, when afterwards examined, proved to consist of layers of moss placed one on the top of the other. The force used in pressing the wet and muddy material together had rendered it sufficiently stable to stand the work required of it by the bird, but finally on one piece at the base being removed the whole structure at once came to pieces. Both birds worked at the nest hard for upwards of an hour, until nearly 10 A.M., when, as they seemed to have finished work for the time being, I went away. I left the camp the next day and did not return for nearly a month, when I took six eggs from the nest, two of which began to show signs of having been sat on, though the others appeared to be fresh.

"They lay from four to six or even seven eggs, which are, as usual, both white and round. The size varies very much with different individuals. When the eggs of this or of any other Kingfisher are first blown, they may be seen to have a peculiar marking, resembling what is known as the water-mark on watered white satin ribbon. This is only observable when held up to the light and it soon fades; but it is sufficient to distinguish the eggs of Kingfishers from other white round eggs, such as those of the Bee-eaters and others. The eggs are extremely hard and close in texture and are highly glossed; so close is the grain that if a drop of ink be placed on the egg and wiped off in a minute, it will be seen that none has penetrated into the shell.

"The situation chosen for the nest is more often than not in dense forest, and may be either the bank of a running stream, a ravine with deep precipitous banks, a steep hillside, or any other suitable place which can afford both protection from much sunlight and safety from interference from living things other than birds themselves.

"They breed only in the valley, never, as far as I know, ascending to any height for this purpose; 4000 feet is the highest altitude at which I have taken their nests.

"I have taken, or had brought to me, eggs on the 6th of April and on intervening dates up to the 26th of July.

"The habits of this bird are almost as peculiar as are his ways of nidification. Fish form a very minor part of his diet; a principal part of it is locusts and crickets, and this it takes by swooping down on them from some perch as if diving after fish, and seizing them from the bushes and grass, without halting in its

flight. It also captures prawns, small crabs, and water insects from stagnant pools, and I have once or twice seen it take cicadæ from the trunk of a tree."

Mr. Oates records the following note from Pegu:—"April 15th. Nest with five eggs.

"June 3rd. Nest with three young birds and one addled egg. Breeds in thickly wooded ravines."

And, lastly, from Tenasserim I have the following note from Mr. J. Darling, Junior:—"March 31st. Found a nest of *Halcyon smyrnensis* with 5 eggs, slightly set, some 20 miles E. of Tavoy."

Typically, the eggs of this species, like those of its congeners, are very spherical, and one or two specimens that I possess are almost absolutely perfect spheres, but here and there a very broad oval takes the place of the sphere. The eggs of course are pure white, often more or less discoloured as incubation proceeds, and adorned, when fresh, with a beautiful gloss similar to that observable on the eggs of Rollers and Bee-eaters. Unlike the eggs of these species, however, the Kingfishers rapidly lose their gloss, and, as a rule, long before the eggs are ready to hatch off they have entirely lost that brilliantly polished appearance which distinguishes them when freshly laid. In size the eggs vary greatly; the smallest specimen in my collection is exactly the same size as Hewitson's figure of the European Bee-eater's, while the largest is but little smaller than the figure immediately below this latter of the European Roller's egg. Of course, as a rule, these eggs are smaller and rounder than those of the Indian Roller; but I have one egg taken by Colonel Marshall, R.E., with his own hands, as big as, if not bigger than, any Roller's egg,—a surprising fact, considering the relative sizes of the two birds.

In length they vary from 1.05 to 1.27 inch, and in breadth from 0.97 to 1.12 inch; but the average of forty-eight is 1.13 by 1.03 inch.

### *Halcyon occipitalis* (Blyth). *The Nicobar Kingfisher.*

*Halcyon occipitalis* (Bl.), *Hume, Rough Draft N. & E.* no. 132 bis.

Mr. Davison says:—"I found the Nicobar Kingfisher (in the Nicobars of course, to which it is restricted) commencing to breed about the latter end of February; but the only egg I obtained was taken from the oviduct of a female which I shot on the 24th of February just as it was entering its nest; the egg was perfect, and would no doubt have been laid in a few minutes. I found three nests on the island of Camorta, and all of them were excavated in deserted ants' nests. These ants' nests are generally placed against the trunks of very large trees, but occasionally against those of cocoanut-palms, at heights of from 4 to 20 feet from the ground, and vary from 12 to 30 inches in diameter; being composed, as I believe, of some sort of clay, they are extremely hard and difficult to break. I had to dig out the nests

with a large clasp-knife. It is in the larger nests that the King-fishers' nest-holes are excavated. The tunnel, about 2 or  $2\frac{1}{2}$  inches in diameter, is in the centre of the ants' nest, and goes in for about 6 inches, where it terminates in a chamber about 7 inches in diameter; the bottom of the chamber contains a quantity of pulverized earth. I saw the bird fly out of two of the nests, and shot the female above referred to as she was entering the third."

The egg in question is of the purest white, quite devoid of gloss (which it would probably have laid in the normal fashion instead of being obtained by a cæsarian operation), is a broad oval, somewhat pointed towards the smaller end, and measures 1.16 by 0.98 inch.

The late Mr. A. de Roepstorff furnished me with the following note:—"I got two eggs on the 13th March, 1875; the nest was in a hollow white ants' nest in a mangrove-swamp, attached to a cocoanut-tree; a female bird was caught in the nest. These nests are very common all over the place. The bird keeps dodging round and round and suddenly it disappears. A Nicobar man saw this one, ran up and stopped the hole with a cloth, and we dug out mother and eggs."

## Order CORACIÆ.

### Family CYPSELIDÆ.

#### Subfamily CYPSELINÆ.

##### *Cypselus melba* (Linn.). *The Alpine Swift.*

*Cypselus melba* (Linn.), *Jerd. B. Ind.* i, p. 175; *Hume, Rough Draft N. & E.* no. 98.

I have never taken the eggs of the Alpine Swift, nor do I know anything positive of its nidification within our limits. I have, however, several of their nests sent me by Miss Cockburn from near Kotagherry (Nilghiris).

They had been built against a rock more or less overhung by slabs of rock. They consist chiefly of feathers firmly cemented together with saliva, but vegetable fibre of different kinds of dry grass also formed part of the thick, coarse, felt-like mass.

Three or four nests at least appear to have been grouped together in one mass. One chamber, which is perfect, measures about 5 inches in diameter and was about 3 to 4 inches in height. The walls of the nest average about an inch in thickness, but in many places, owing to the necessary fillings-in where the more or less circular chambers meet each other there is a much greater

thickness of material ; and where two chambers are nearest to each other, the partition wall rarely exceeds  $\frac{1}{2}$  inch.

Later, Miss Cockburn obtained one egg from a nest on this same rock, which she kindly sent me ; she did not take it herself, but I think that there is no doubt of its authenticity. It is a very long oval egg, pure white and rather glossy, and measures 1.1 by 0.73.

Messrs. Davidson and Wenden, writing of the Deccan, say :— “ Permanent resident in Satara. Breeds, D. thinks, about the cliffs, and on old buildings in the fort there.”

Colonel McMaster wrote many years ago :— “ I saw several very fine Swifts which seemed to be this species at the old fort Gawilgarh and at Chikalda, 3700 feet, in April and May, but could not get a specimen. They appeared to be breeding about the perpendicular cliffs on which Gawilgarh is perched.”

*Cypselus affinis*, J. E. Gray. *The Common Indian Swift.*

*Cypselus affinis*, Gray, *Jerd. B. Ind.* i, p. 177 ; *Hume, Rough Draft N. & E.* no. 100.

The Common Indian Swift breeds throughout the plains of India, and in the Himalayas up to a height of about 6000 feet. I cannot hear of its breeding at all high up on the Nilghiris, but I found it on the Aravalis breeding at the top of Taragurh and on Mount Aboo.

It has at least two broods in a year, and eggs may be found any time from February to August, both months included.

It is very capricious as to its choice of a nest-site, but having once secured one to its liking, returns thither with a pertinacity that no ordinary persecution in the way of robbing and destroying nests will overcome. They breed in company ; solitary nests are, as far as my experience goes, unknown ; from a dozen to fifty pairs will be found nesting together ; the nests either clustered together in one dense mass, as when they choose the roof of some little cave, or the interior of some old Moslem dome or Hindoo shrine, or else scattered about in little groups, in close proximity, as when they occupy a verandah, and each pair of rafters has its half-dozen nests. Perhaps, on the whole, it prefers inhabited to deserted buildings, but I have found its nest a hundred times in both.

The nests vary very much in size, shape, and material. I have taken them from between two very closely-set rafters in a railway-station, long half-tubes a foot in length, some 4 inches in external diameter, composed wholly of feathers cemented together by saliva, and scarcely  $\frac{1}{2}$  inch in thickness. Two now before me are large masses, 10 by 6 and  $2\frac{1}{2}$  to 3 thick, of grass, in which many feathers of doves, parrots, peafowl, sarus, duck, some little sheep's wool, and a bit or two of twine are all mingled. The bottom portions are a good deal cemented together by saliva, but the interior is by

no means hard or smooth ; others again are *much* smaller, globular, and having the whole of the materials firmly agglutinated together.

In the plains they are not generally lined, but in the hills they often have a warm lining of grass and feathers.

Captain Hutton says :—“ This is a very abundant species at Jeripanee, below Mussoorie, coursing and screaming through the air with great rapidity and shrillness. It does not construct a nest of mud like the Common Swallow, but attaches straw, rags flags, and feathers, all together by a glutinous cement, beneath the roof of verandahs between the beams. The nest, although made of such frail materials, which are not interwoven like those of other nests, but simply glued together, is nevertheless exceedingly tough, and will resist a moderate poke from a stick. It is lined with feathers and straw, and the eggs much resemble those of *H. daurica*, being pure white, and of a narrow, lengthened appearance. With us it breeds in June and July, laying from two to four eggs.”

Mr. James Aitken writes :—“ This bird is of course abundant, and its rushing flight and shrill cry often strongly recall summer evenings at home. Its habits are indeed but a feeble copy of those of the English bird, the same circling near their nests, always screaming as they pass them, and the same assembling in numbers high in the air in the evening, though they fly low much more frequently. They breed once in February, and again during the monsoon. The nests are probably better known than those of any other Indian Swallow ; they are generally built under roofs, sometimes in a crevice between the wall and the roof, but often attached to the roof itself. In the latter case the straws of which the nest is composed are so firmly agglutinated that it tears like a piece of matting ; and it is generally ornamented without, as well as lined within, with feathers. Two or three long, white eggs are laid. The young, like those of the English Swift, never become perchers, but take boldly to the wing whenever they leave the nest, returning to it when fatigued until they acquire their full powers. Numbers take possession of the porches and verandahs, where these are high enough, of the cutcherries and other large buildings now erected all over the land, and fly backwards and forwards, building their nests, or tending their young, totally regardless of the crowd that may be moving below. It is no uncommon thing to see the top of an archway covered with their nests, all closely packed together, but where there is ample accommodation, as in a cutcherry verandah, each nest usually stands apart.”

Dr. Scully remarks :—“ The Common Indian Swift is very abundant in the valley of Nepal during about eight months of the year, but migrates to warmer regions in winter. It arrives in the valley about the first week in March, and by the 10th of that month it is found in swarms near all the towns and villages. It was noticed in the Nawakot district about the end of November. The breeding-season seems to last from April to July.”

Major C. T. Bingham says:—"Breeds at Allahabad in February, March, and April, and again in July and August. And at Delhi in March, April, and August."

Colonel Butler, recording his experiences at Kurrachee and again at Mount Aboo, tells us:—"Kurrachee, March 19th, 1877. A colony of about 50 nests all stuck together inside the roof of a verandah. Every nest contained *two* eggs without an exception; and all of the eggs were too much incubated to be blown. I saw some hundreds of nests a few days later on the Oyster Rocks in the Kurrachee Harbour, and several more colonies in other parts of Kurrachee. They lay all through the hot weather and in the rains.

"Hundreds of the Common Indian Swift breed in the celebrated Dilwarra temples at Mount Aboo."

Captain Horace Terry says:—"I wonder if these birds are influenced in building by the rains, or whether the following circumstance is mere chance. Several pairs began to build in the verandah of my bungalow at Bellary, in June 1877. It had then been raining for a day or two and then suddenly ceased. The birds then left off building and disappeared; after that the rains did not set in regularly till the latter end of the following month, when the birds (presumably the same ones) returned, completed the original nest, and reared their young."

Writing from Sambur, Mr. R. M. Adam remarks:—"This Swift is very common, and builds in the old tombs and mosques. I found a *congeries* of about thirty nests in a small tomb, and these were all closely packed together; some had openings at the sides, while others had tubular-shaped necks about 2 inches long, projecting from the side of the nest. The nests were composed of pieces of straw, fine twigs, cobwebs, and fluffy feathers, all agglutinated together, with here and there some bright-coloured feather of a Parrot or Roller stuck carelessly on the outside. A nest which I detached measured from opening to end  $7\frac{1}{2}$  inches, in breadth it was 4 inches, and the opening was 2 inches in diameter. The nest was oval in form, coarse and lumpy in texture externally, but comparatively smooth inside. The egg-cavity had a lining of fine feathers, and the entrance was lined with fluffy feathers. Nearly every nest contained a bird; and in some cases I found two birds."

Dr. Jerdon states that "their nests are composed of feathers, grass, straw, cotton rags, sometimes pieces of paper, agglutinated firmly together by the secreted mucus of their salivary glands, occasionally, perhaps, mixed with mud and rubbish. The inside of the nest is hard, glistening, and smooth, and feels, says Theobald, 'like coarse cardboard.' They vary much in shape; sometimes a first year's nest is open at the top; but they are usually closed, and communicating at the side; at times of moderate size, at other times very large, and communicating by a sort of tubular neck. They are very solid and heavy, and often closely packed together. They are built against the rafters or beams, under the roofs of huts

and houses, in the corners of old stone buildings, and in verandahs, either inside or outside, if there is protection from sun and rain. Various observers describe the nest as somewhat differently constructed. Burgess says that he has seen their nests crowded together under the roofs of old buildings, choultries, and temples ; one nest from a rock was built of mud, lined with grass, and contained two white eggs. Layard states that in Ceylon they breed in great numbers on rocks, also under bridges, and that the nests built in clusters are composed of mud and grasses, with a small round entrance, precisely resembling those of the Martin (*H. urbica*) ; the eggs, from two to four in number, pure white. Adams says that the nest is of mud, mixed with wool and feathers. In some of these cases the great weight and solidity of the nests may have led the observer to conclude that they were made of mud. The nest has generally a slight hollow in one place for the reception of the eggs, which are usually two in number, sometimes three, and pure white."

I may here add that I have seen not hundreds, but tens of thousands of these nests in all parts of Continental India ; and that, like Jerdon, I never knew of this species using any mud in the construction of its nests.

Mr. G. Vidal writes from the South Konkan :—" Common throughout the seaboard. Nests found in February and April in clusters on the island fort of Suvamurdug and the rocky cliffs on the coast."

Mr. W. V. Legge, writing from Ceylon, says of the breeding of this Swift :—" The Indian Swift breeds in February and March in the south-east of Ceylon, nesting under bridges and in the roofs of outhouses. I found a large colony in the month of March, 1872, nesting under the tiles and between the rafters of the roof of the salt store at Hambantota. The nests were placed close together in some instances, and were of all shapes and sizes ; they were constructed of grass and native cotton, and lined with feathers mixed with the latter material. The eggs, in most instances, were three in number."

And Colonel Legge gives March to July as the limits of the breeding-season in Ceylon.

I think three is the normal number ; I have certainly far more often found three, or even two, than four eggs.

Typically, these eggs are excessively long and narrow ovals, pointed towards one end, and often somewhat pyriform in shape. They vary, however, much both in size and shape ; and of specimens of my own taking, some are fully one third longer than others, while the cubic contents of one egg I have must be fully twice that of another. In colour they are of course a perfectly pure and spotless white, with commonly scarcely a trace of gloss, though occasionally a slightly glossy egg is met with. Several specimens I have are fully as long as the egg of *Cypselus apus* figured by Mr. Hewitson, but their breadth is rarely even five sevenths of the one there represented.

In length these eggs vary from 0·72 to 1 inch, and in breadth from 0·52 to 0·62 inch ; but they average 0·87 by 0·57 inch.

**Cypselus batassiensis, Gray. The Palm-Swift.**

*Cypselus batassiensis* *Gray, Jerd. B. Ind.* i, p. 180.

*Cypselus palmarum, Gray, Hume, Rough Draft N. & E.* no. 102.

The Palm-Swift breeds, I think, twice in the year ; at any rate I have myself taken the eggs in March, and again in July, and I have had them sent me in the latter part of June and early in April.

They nest solely on the “*Tar*” or toddy-tree (*Borassus flabelliformis*).

The large fan-shaped leaves of this palm get bent by the wind, and hang down so that the points of the leaves turn somewhat inwards ; and it is to the under surface of that portion of the leaf which is bent inwards that the nest is attached.

The bent portions of the leaf stand at an angle of from 40 to 70 degrees, so that the under surface becomes in fact the upper surface, and presents a sloping furrowed bank to which the nest is attached. In one of these furrows formed by the large plaits of the leaf, and always about the centre of this latter, a tiny watch-pocket shaped nest, composed of fine down of the *Argemone mexicana* and other plants, or in other cases of fine feathers cemented together by the saliva of the bird, is firmly glued. The actual pocket of the nest is rarely above 1½ inch in circumference and ¾ of an inch in depth, but the back portion of the nest runs up the plait from 2 to 3½ inches. It is a curious fact, that while the rest of the nest is pretty soft, the edge of the pocket in front is matted into a sort of cord, just as in the case of the watch-pocket a piping is run round the edge. In one or two nests that I have seen, the birds have incorporated the soft petals of the white poppy (so largely grown for opium in Behar, where this species is specially abundant) with the other materials of the nest.

As a rule, only one or at most two pairs are found breeding on the same tree ; but I once saw a whole colony located in a single palm.

Three appears to be the usual complement of eggs, but Mr. R. M. Adam, from whom I first of all received the eggs and nest of this species, informs me that he has found as many as five in a single nest.

Mr. R. Thompson, writing from the Mirzapoor District on the 18th March, 1869, remarked :—“ On a toddy-palm (*Borassus flabelliformis*) I observed several nests. With some difficulty I got down one with two eggs ; one of the eggs unfortunately got broken. The nest was stuck between two ribs of the leaf of the palm, and the female bird looked as if she was sitting up against

it—so small did the nest look, and such the apparently uncomfortable attitude of the occupant.

“Near the nest was a colony of bats, *Nycticejus castaneus*. I killed out of the lot in one shot twenty-one bats. The palm was alive with them and with the Swifts. I noticed these birds clustering on the leaf of the palm between the ribs of the fronds. When moving up and down, they crawled with a shuffling kind of motion, as if their legs were too short for progression.”

Mr. W. Theobald again has the following on the breeding of this bird in Monghyr and Prome\* :—“Lays in the third week of June and in July. Eggs, three in number, long pyriform; size, 0.80 inch by 0.45 inch; colour pure white. Nest of vegetable down, with a few feathers, agglutinated with mucus to the frond of the *Borassus*.”

Major Bingham writes :—“I have only found it breeding at Allahabad in March, April, and May, and again in July and August. The little nests are made of agglutinated feathers in shape like a little watch-pocket, and stuck against the underside of such leaves of the toddy-palm as have been bent down by the wind. The usual number of eggs is three, but I have found four.”

Mr. James Aitken makes the following remarks :—“Palm trees are scarce in Berar, but wherever a solitary one rears its head there may be found the Palm-Swift flying round and round it. I once, and once only, saw several of these birds flying about a grove of mango trees where there was not a palm tree within miles.”

Writing of the South Konkan Mr. G. Vidal says :—“Seen in large numbers at Málvan and Vengorla. I only know at present of two Palmyra palms (*Borassus flabelliformis*) in the whole district, one at Bankot and one at Málvan. At Bankot, in April, I saw a pair of these Swifts flying out of the solitary Palmyra, but found no nests. At Málvan, in January and February, I saw numbers flying in and out of the leaves of the one tree there. They must have had nests, but the tree was very high, and I could get no one to climb it. There are no Palmyras at Ratnagiri, and as the species is common there about the cocoanut and betel-nut gardens, it is probable that, as Mr. Davidson noted in Mysore (*vide* S. F. vii. 172), they nest here in betel-nut, if not in cocoanut palms also. There are certainly fifty times too many birds at Málvan to find accommodation in the one Palmyra palm, though it is evidently a favourite haunt.”

Mr. J. Davidson writes :—“I notice that both Dr. Jerdon and Mr. Hume state that the common Palm-Swifts (*C. batassiensis*) invariably breed on the Palmyra palm. In this district the Swift is rather common, and the Palmyra palm is very rare; indeed I have not seen more than a dozen trees altogether. On almost all of them I have found the Swift breeding, but from the number of

\* Mr. Theobald here confounded the present and the next species. The former is found at Monghyr and the latter at Prome.—ED.

Swifts I have long been sure that they must breed on other trees, and to-day I took a nest on a leaf of the betel-nut palm with three fresh eggs. There were many other Swifts evidently breeding in the same garden. The leaves of the betel-nut palm bend down almost in the same way as the Palmyra. The nest was, however, on one of the upper leaves which was nearly horizontal."

Colonel Legge, writing of Ceylon, says:—"This species breeds from October until April, probably rearing two broods in the season, as I have found eggs and young of the same colony during both these months."

The egg, a miniature of that of *C. affinis*, is a long oval, slightly compressed towards one end. The texture of the shell is somewhat fine, but it has commonly little or no gloss. In colour it is a pure white, entirely free from spots or specks.

In length the eggs vary from 0·65 to 0·75 inch, and in breadth from 0·42 to 0·48 inch; but the average of more than fifty eggs measured was barely 0·71 by 0·46 inch.

### *Cypselus infumatus*, Sclater. *Sclater's Palm-Swift.*

*Cypselus infumatus*, *Sclater*, *Hume*, *Rough Draft N. & E.* no. 102 bis.

As yet Sclater's Palm-Swift (*C. tectorum*, Jerd.) has only been found breeding in the Garo and North Cachar Hills, during the months of March, April, and May, at heights of from 2500 to 4000 feet above the sea-level, but it undoubtedly breeds all over Burma. The following note was given me by Dr. Jerdon:—"They attach their nests to the palm-leaves used by the people to roof their huts. The roofs consist of two separate layers of leaves, and it is to the upper surface of the lower layer that the nests are attached. These nests resemble closely those of *C. batassiensis*, and are tiny little shallow saucers, some 2 inches in diameter, composed of some feathery seed, with here and there a stray feather, agglutinated with saliva after the fashion of the genus."

I have never seen the eggs, but Colonel Godwin-Austen tells us that "this little Swift was numerous in the Naga villages around Asalú in March and April, and was then breeding in the roofs of the houses. A nest that I obtained was attached to the upper surface of a kind of palm-leaf, in the thatch of a house; it is a neat, very shallow, construction of fluffy grass-seed, stuck together with saliva, a feather or two intermingled with the grass. The eggs were two in number, pure white, resting against the lower side of the nest, which is just of sufficient depth to retain them, so that the parent bird can hardly be said to sit on her eggs in the nest, but rather hangs on to it in apparently a most uncomfortable position; and how the young when hatched remain with safety in the nest, it is difficult to understand, unless the power of hanging on by the claws is thus early developed."

**Collocalia unicolor (Jerd.). *The Nilghiri Swiftlet.****Collocalia nidifica (Lath.),* *Jerd. B. Ind.* i, p. 182.*Collocalia unicolor (Jerd.),* *Hume, Rough Draft N. & E.* no. 103.

The Nilghiri Swiftlet breeds on all the hills of Southern India and Ceylon.

Mr. Davison tells me that "there are several places on the Nilghiris where the Hill Swiftlet breeds largely; one is a large cave above the main road from Coonoor to Ooty, close to the last toll-bar, before the cantonment of Ooty is reached: another is a cave below the Hooker Chinchona Estate at Pykarra, near the footpath leading from Pykarra to Musnagoodie. The birds build in company, the nests often being placed in regular tiers one above the other, and often so close that they touch each other. The nest is never composed entirely of saliva, but always consists chiefly of a long grey thread-like lichen (so common on all trees on the Nilghiris) firmly agglutinated together with the saliva. The nest is a small shallow semi-saucer-like structure glued to the rock. The normal number of the eggs appears to be two; they are quite white, very elongated, and are nearly the same thickness at both ends. They breed in April, May, and the early part of June."

Mr. A. G. Cardew, C.S., also writing of the Nilghiris, says:—"This bird breeds at several places on the Nilghiris during May and June. The nests occur in the darkest parts of caves, generally in complete darkness, and are small but compact cup-shaped structures, strongly made of lichen which is fastened together and the nest glued to the wall by the mucous secretion of the bird. They measure about  $2\frac{1}{2}$  inches by 2 and are very shallow, the egg-cavity not exceeding  $1\frac{1}{2}$  inches in the largest, while in many the walls are less than an inch above the bottom of the nest. No lining of feathers is used, and the amount of inspissated mucus is very small, the structure being wholly of lichen. The number of eggs is invariably two. On visiting one of the most populous caves on the 6th May, I found 40 nests, among which three or four had young birds and an equal number were empty; every one of the remainder contained two eggs. At a later visit on the 20th of June, the number of nests was about 25, and of these the majority were already empty, three having eggs and four young birds. The eggs, which are pure glossless white, are remarkable for their slightly cylindrical shape, and measure from 0.82 to 0.94 in length, and from 0.52 to 0.55 in breadth."

Dr. Jerdon makes the following remarks:—"In 1846, I paid a visit, in company with Mr. Ward, M.S.C., to Pigeon Island, some miles out at sea to the south of Honore, which was said to be the resort of these birds. We found a large cave at one end of the island with a few of the nests, but of the second-make and inferior to the first, being mixed with feathers and extraneous matter. There were no eggs at this season (the end of December), and we did not see any of the birds to identify the species. A

native who had guided us to the cave said if we waited till 8 or 9 o'clock P.M., the birds would come. We instructed him to do so and to catch some of them in a net he had with him for the purpose. It is known to have other breeding-places on the Malabar coast, *viz.*, the Vengorla rocks, where one hundred-weight of nests is said to be produced annually. If so, this must be the largest breeding-spot on the coast. Also the Sacrifice Rock, 20 miles south of Tellicherry; besides, I daresay, others. I visited Sacrifice Rock in March 1849. There is one cave here, which had perhaps fifty to hundred nests, and a few had eggs in them. Very few of the nests were of the first make, these being annually taken away by some Moplahs from the mainland. The birds were at this time flying about, feeding on the flies which abounded at the edge of the rock. About twenty couples, perhaps, were present, not more. I doubt if all the places I have enumerated on the western coast would contain the nests of a quarter of the number of these Swiftlets which I have seen at once in one locality; if so, where do the others breed? It has been suggested that they may nestle in inland caves; but all my enquiries have failed to discover any in India."

Mr. G. Vidal gives us the following account of a colony breeding in a cave on the sea-coast. He says:—"This species, as Jerdon says, is found at one of the group of rocks which lie between Vengorla and Málvan, some five or six miles from the mainland, and breeds there regularly every year. The right to collect the nests is annually sold by auction, and realizes on an average about Rs. 30. Two trips are made by the farmer—the first towards the end of February, and the second about the first week in April. The first harvest yields about 14 lbs., and the second from 28 to 42 lbs. Either the yield was overstated by Jerdon, or else the number of birds has greatly diminished since he wrote; half a hundredweight is now the maximum outturn.

"None of the nests I have ever got from the Vengorla rocks are pure white. In April 1878 I sent my shikaree, to bring nests, eggs, and birds, and he returned with specimens of all three. The birds were all *Collocalia*, and the nests all mixed with grass and feathers, the saliva being pure only where the nest is attached to the rock, and on the rim of the saucer. The nests vary a good deal in size and shape. They are very shallow, seldom deeper than half an inch, and have a diameter of about two inches. Externally the saliva, freely mixed with grass and feathers, is smooth and coagulated. Inside the cup it forms a network of fine shreds. They look at a little distance exactly like deep oyster-shells with one side flattened, the saliva, where it is smoothed down, having a pearly appearance. As this batch of nests was collected about a week after the farmer had paid his last visit to the rocks for the season, and had presumably left no nests worth taking, and as the natives, who ought to have known, persisted in saying that pure white nests were to be had at the first take, I could come to no definite conclusion about the matter. However,

in February 1880, I sent my man again to the rocks, with the farmer's people. They were there for three days, and returned on the 28th with about 12 or 14 lbs. of nests, which I examined. These nests were undoubtedly *first* nests, as not a single egg had been laid. *All* were quite as impure and mixed with grass and feathers as those I had got in the preceding April, when there were eggs or young birds in every nest. The farmer still held out that white nests are sometimes got. Of course it is possible that a few pairs of *C. spodiopygia* may breed in the same cave, but none of the specimens got were of this species, and I think it is highly improbable that they occur. Determined to sift the matter as closely as possible, I sent my shikaree again with the farmer's people for the April take. He spent three days on the rocks, from the 7th to 9th of April, and returned with about two dozen of the purest and comparatively whitest nests that were found on this occasion, as well as eggs and specimens of *Collocalia*. The nests were *all* mixed with grass and feathers precisely as before.

"The evidence, therefore, is now pretty complete, and shows conclusively that *Collocalia* does not make pure white nests in this locality. The Vengorla nests are all despatched to Goa in the first instance, but I have not yet ascertained their ultimate destination. Commercially, they must rank as a very third sort commodity. The nests I got in February were literally swarming with common bugs."

Captain Horace Terry writes:—"One day, while I was in the Pulney Hills (June 1883), a native whom I employed to collect for me brought me word that he had found some Swifts breeding in a cave. I went with him the next day, and close to the Pillar Rocks my guide showed me a large sort of hole, and intimated I was to go down it. I did not quite like the look of it; it was the sort of place where one might meet anything and with no room to pass. However, as the man absolutely refused to go first (which was odd, as he assured me he had been there the day before), I had no choice, so I went. After going through a sort of tunnel for some few yards in a downhill direction in the dark, I found myself in a good-sized cave with a high roof, and an opening (quite inaccessible from the outside) on to the face of the cliff. Here were the Swifts safe enough, but what puzzled me was how on earth the man knew they were there, as I am quite convinced he had never been down that hole before; there were no signs of footmarks in the sand, his description of the cave was quite inaccurate, and he could not possibly have seen anything of it from the outside. The cave was occupied by a large number of Swifts (*C. unicolor*) flying in and out, who had their nests near the roof of the cave, quite out of reach, and it was impossible to get at all near to any of them."

Mr. Bourdillon, writing from Travancore, says:—"The cave in which the Edible-nest Swiftlets breed is on the opposite side of the valley to this bungalow, at an elevation of about 2600 feet. It is formed by the displacement of a huge mass of rock, which, sliding

from its original bed, has left a slit in the side of the hill, blocked at one end, some 40 yards long, 30 feet high, and of an average width of about 3 feet. The mouth of the cave is much darkened with stones and shrubs, so that 10 yards from the entrance, without a light of some sort, one gets a very hazy idea of the surroundings. We had a candle, and after going the whole length of the cave we set to work counting the nests of the Swifts. This was no easy job ; however, with a little trouble we made out that there were fully 250 nests in the cave, of which two in every three were occupied by eggs or young. While all this was going on, the old birds were in a great state of excitement, and occasionally one, more courageous than the rest, would dash at the candle and, putting it out, leave us to grope about for the matches. We took three or four nests, and altogether a dozen eggs. Of these two only were hard-set, the rest being perfectly fresh ; and as we took only solitary eggs, it would appear that this Swift occasionally lays but one egg, though far more frequently two, and never, I believe, more. As I hope my brother will send you specimens of eggs and nests, I need only say in passing that the nests are pretty solid cups with a shallow cavity, composed principally of moss and the feathers of the bird, cemented to the rock and neatly lined with threads of the peculiar isinglass-like substance excreted by the bird. The eggs are pure white, smooth, and slightly glossy ; and of those taken the measurements ranged from 0.81 to 0.91 in length, and from 0.52 to 0.59 inch in breadth, averaging 0.85 by 0.55.

“ This accomplished, we had to secure some of the old birds. After expending all our small stock of cartridges we had only two birds to show, and these on dissection proved to be males. One bird was evidently in the breeding-stage and the other not ; and I may here note that the breeding one had a very highly-developed gland beneath the chin, containing a sticky creamy substance, which was no doubt the same as that used to fasten the nest to the rock ; this bird also, when shot, had a piece of moss in its claws, so that one may fairly conjecture it was still building. The other bird had no trace of the gland, at least so far as I could make out without the aid of a microscope. My brother will also send you with the nests and eggs a sample of the guano which was thickly spread over the floor and walls of the cave. This appears to be composed principally of the undigested portions of the birds’ food, with some proportion of soluble ammoniacal matter, which has a rather disagreeable smell.”

Colonel Legge thus describes the breeding-habits of this Swift in Ceylon :—“ The breeding-season of this little Swiftlet in Ceylon lasts from March until June. It nests in large colonies in various caves in the hills and mountains of the central and southern parts of the island. Many of these are known from seeing the birds haunt the vicinity of certain precipitous hills ; but few have been visited and examined on account of the general inaccessibility of these resorts. Among those which are known are two situated on

the rocky hills of Diagallagoolawa, near Pittegalla, on the banks of the Bemtota river, and which are referred to by Layard; several occupied by large and small colonies on the Dambetenne and Piteratmalie estates on the south face of the Haputale range; one on Pedrotallagalla, spoken of by Kelaart; and another which I am informed of in a hill called Maha-ellagala, near the 'Haycock' Mountain, as also another in the Nitre-cave district. Besides these there are, I believe, colonies in the 'Friars-Hood' or some of the surrounding rock-hills and in Rittagalla, the above-mentioned mountain, situated between the Central and Trincomalie Roads. The celebrated cave in the Haputale range, and the only one which I have had the good fortune to visit, is situated on a bold peak standing out above and towering over the Dambatenne and adjoining estates, which form one of the finest sweeps of coffee-ground in Ceylon. . . . At a point where the great gorge suddenly commenced by a sheer precipice drooping down about 1000 feet into the lower estate, stood the fine bungalow occupied by the gentleman, Mr. Inray, who was to be our kind host for the night; and at the back of this, at the top of a rich slope of coffee, towered up a rocky buttress, in which the Swiftlets of Haputale propagate their species. In this precipice a vast boulder, about 70 feet in height and 50 in breadth, has at some period slipped away from the face of the mountain, and leans against it at an angle of about  $30^\circ$ , forming a lofty narrow cavern. Here about 300 pairs of birds have their nests built against the inner side of the boulder, which is convex and corresponds with the concave face of the main mass. There are no nests on this latter, down which there is doubtless a considerable amount of drainage, and the instinct of the little birds is here wonderfully displayed in rejecting the wet side of the cavern, which would seriously impair the stability of their gelatinous nests. These are placed in tiers, one above the other, about 15 feet from the guano at the bottom of the cave; in places three or four were joined together, the back part of the under nest being prolonged up to the bottom of the one above it. The little structures were by no means edible, being constructed of moss and fine tendrils, arranged in layers and cemented with the inspissated saliva of the bird, the back part attaching the nest to the rock, as well as the interior of the cup, being, however, entirely of this material. I have seen one or two nests from Pittegalla almost wholly made of this substance; but even these were mixed to a certain extent with foreign or vegetable material. The interior of these Dambetenne nests was in most cases oval, the longest diameter, which varied from 2 to  $2\frac{1}{2}$  inches, being parallel to the rock. In depth the egg-cup was, on the average, about 1 inch. At the date of my visit, the 22nd of May, nearly all the nests contained young, two being the average number. A series of eggs procured at another time, and which I have examined, were of various shapes, long ovals being the predominant; they were pure white, and varied from 0.81 to 0.83 inch in length by 0.51 to 0.54 in breadth. It is noteworthy that the partially-fledged young

which were procured for me on this occasion, and which I kept for the night, scrambled out on to the exterior of the nests and slept in an upright position with the bill pointing straight up. This is evidently the normal mode of roosting resorted to by this species.

“ The interior of this cave, with its numbers of active tenants, presented a singular appearance. The bottom was filled with a vast deposit of liquid guano, reaching, I was informed, to a depth of 30 feet, and composed of droppings, old nests, and dead young fallen from above, the whole mingled into a loathsome mass with the water lodged in the crevice, and causing an awful stench, which would have been intolerable for a moment even, had not the hundreds of frightened little birds, as they screamed and whirred in and out of the gloomy cave with a hum like a storm in a ship’s rigging, powerfully excited my interest and produced a long examination of the colony. This guano-deposit is a source of considerable profit to the estate, the hospital-manager of which informed us that he had manured 100 acres of coffee with it during that season. Besides this colony there are two smaller off-shoots on the adjoining estate, in one of which, Mr. Bligh tells me, the birds have to pass through a cloud of spray in order to gain access to their nests.”

The eggs that I possess of this species, all sent from the Nilghiris, are a dull, almost wholly glossless white; as a rule slender elongated ovals, almost cylindrical, and sometimes absolutely cylindrical; at times slightly pyriform, and typically, I think, somewhat compressed just beyond the middle. They vary in length from 0·79 to 0·9 inch, and in breadth from 0·53 to 0·58 inch; but they average 0·83 by 0·54 inch.

**Collocalia linchi, Horsf. & Moore. *Horsfield's Swiftlet.***

*Collocalia linchi, Horsf., Hume, Rough Draft N. & E. no. 103 bis.*

Horsfield’s Swiftlet breeds abundantly in both the Andamans and Nicobars.

Normally it breeds in caves; indeed, in a manuscript note given me with many others by the late lamented Colonel Tytler, I find the following:—“ I may note that I was upwards of two years in the Andamans, and never either saw or heard of any species of *Collocalia* building inside of houses, sheds, or the like; these species always build inside caves immediately on the sea-shore.”

But since Colonel Tytler left the Andamans, a change has come over the spirit of their dream, and at the Settlement of Port Blair they breed freely inside houses, both on Ross and Chatham Islands, the interior of the saw-mills being their most favourite haunt. There is another shed at Viper also in which they breed.

There has been some grave error in regard to the nests of this, the commonest of the Andaman and Nicobar Swiftlets; it does *not* make any of the edible nests. There is no mistake about this; I have

shot the birds and taken the nests out of caves, and Davison has done the same out of buildings where they had never been disturbed, and the nests are in all cases similar—somewhat shallow, flat-bottomed, half or two-thirds saucers, composed of brown moss, firmly agglutinated with saliva; only along the line of junction with the place of attachment is there a thickish film of unmixed inspissated saliva, and that is brownish and not white.

The white nests are made by *C. spodiopygia*, and probably also by *C. innoxinata*.

The nests of this species, *C. linchi*, vary in size, but they average about  $2\frac{1}{2}$  inches across, stand out from  $1\frac{1}{2}$  to  $1\frac{3}{4}$  inch from the rock or wall, and are about an inch deep. They vary from  $\frac{1}{8}$  to more than  $\frac{1}{4}$  inch in thickness.

How often they breed I cannot say; but many of the nests which I found in a cave at the little Jolly Boy, Macpherson's Straits, contained fresh eggs on the 9th of March.

The eggs are pure white and entirely devoid of gloss; long ovals very obtuse at both ends, and some of them almost cylindrical, while others again have a pyriform tendency. The eggs vary greatly in length, viz. from 0.64 to 0.75 inch, but much less so in breadth, i. e. only from 0.42 to 0.46 inch. The average may be taken at 0.7 by 0.45 inch.

I must note here that Captain Beavan is altogether wrong in what he says (Ibis, 1867) about this species, and he must have written from hearsay, for his own observations are excessively accurate. He remarks that the nest of this species is considerably smaller and perhaps whiter than that of "*nidifica*" (? *innominata*, nobis), on which account it is more valued by the Burmese, who collect both kinds for the Chinese and Penang markets. He adds that "this species is generally abundant at Port Blair, especially between Aberdeen and Navy Bay, where every cave is full of their nests." Now, in the first place, the nests of this species are brown and mainly composed of moss, and are not, so far as I could learn, ever collected at all. In the second place, there are no caves at all between Aberdeen and Navy Bay.

Mr. Davison has watched these birds making their nests; they bring a tiny piece of moss and cling on to the roof; then for four or five minutes you see the little bird's head going backwards and forwards, and then off he flies, and you see that the piece of moss has been stuck on. They do not seem to be able to stick the moss on to white paint. One pair tried for nearly a week to make a nest on a painted ceiling of a house, and covered the carpet below with scraps of moss, but failed to get a single piece to stick; at last they gave it up as a bad job.

Later, however, they succeeded in attaching a nest to this very place. The nest was the usual half-saucer, about 3 inches across and  $1\frac{1}{4}$  in depth, but composed entirely of fine rootlets just glued together here and there with the ordinary gelatine, and a pretty thick film of this occurring where the nest was joined on to the ceiling.

Sometimes four or five will come in together, and all cluster in a lump where the moss is to be stuck, and then a great twittering and skirmishing ensues, till of a sudden all but one, who is left wagging his head over the moss, disappear with a sudden dash.

Subsequently Capt. Wimberley sent me a nest with two eggs, and remarked:—"This was built on to the white-painted ceiling of my house. The little birds have been trying to get a footing there for two years. This is the first time that they have been successful." The nest is rather peculiar, a very loose basket-work of fine roots, rendered perfectly stiff and firm by inspissated saliva, which, however, has only been applied in sufficient quantities to stiffen the roots and attach them firmly together, so that only the barest film can here and there be detected, except along the line of junction with the ceiling, where the attachment has been effected with a film of pure brownish-white gelatine, if I may so term it. The nest is 3 inches wide, and projected 2 inches. The eggs are similar to those we obtained; one measured 0.71 by 0.46.

**Collocalia spodiopygia (Peale). Peale's Swiftlet.**

*Collocalia spodiopygia (Peale), Hume, Rough Draft N. & E. no. 103 quat.*

Peale's Swiftlet also breeds in several of the Andaman and Nicobar Islands.

As yet it has only been found nesting in caves, though the time may come when, like other members of the family, it may resort to buildings.

I found the eggs in a cave on Little Button Island of the Andaman Archipelago on the 21st March, but I do not know whether they have a second brood. The nest, except just at its junction with the rock (where it is brownish), is composed of the most exquisitely silvery white gelatine. Exterioly the surface is compact and somewhat roughened in laminæ; interiorly it is a network of the finest and whitest threads, reminding one of the *Euplectella*. The true nest, which is pure white, and in shape rather more than half of a shallow cup, is from 2 to  $2\frac{3}{4}$  inches broad, stands out from  $1\frac{1}{2}$  to nearly 2 inches from the wall, and varies interiorly in depth from little more than  $\frac{1}{2}$  to a full inch. The attachment films and foundation below the true nest, both of which are brown, vary excessively according to the site chosen for the nest; in some they are almost wanting; in others the film extends for an inch on either side beyond the nest, and the foundation below the most projecting point of the true nest may be  $1\frac{1}{4}$  inches in depth.

The edge of the true nest all round is blunt, like that of an ivory paper-cutter, and the sides gradually increase as they approach the bottom to the thickness of  $\frac{3}{8}$ , or occasionally even  $\frac{1}{2}$  inch. Of course the nests vary in outline, as well as in size and depth, but

the line of the upper edge is generally more that of a horseshoe than of a segment of an oval or circle.

I found the nests capriciously dotted about, *par préférence* in the darkest corners (nowhere out of reach of the hand, for the cave is low), in places a couple of feet apart, in others a dozen clustered together within a diameter of less than this.

As a rule, each nest was separate and distinct, but in a few cases I found two and even three joined together.

Mr. W. Theobald writes to me that "this is the species that breeds at Hnettoung, the Bird rocks, off the Arracan coast. I have taken their exquisite nests fresh in March."

The eggs are, as usual, pure white, more or less cylindrical in shape, devoid of gloss, and slightly larger than those of the preceding species. Two eggs measure 0·8 by 0·52 and 0·82 by 0·53.

**Macropteryx coronatus (Tick.). The Indian Crested Swift.**

*Dendrochelidon coronatus (Tick.).* *Jerd. B. Ind. i.*, p. 185; *Hume, Rough Draft N. & E.* no. 104.

The Indian Crested Swift breeds freely, to my certain knowledge, in the Sub-Himalayan tract, below Kumaon and Gurhwal, in parts of the Mirzapur District, in the Mandla District of the Central Provinces (from which locality Mr. R. Thompson sent me an exquisite little nest), in the Nilghiris (whence also I have received its eggs), and Ceylon, and generally, I believe, throughout the warmer parts of India wherever there are extensive forests.

The breeding-season is from April to June, the place selected is the bare and therefore generally dead branch of some tall forest tree. It is almost impossible to get the egg (for they lay only one) down unbroken.

I owe a nest of this species to Mr. R. Thompson, who took it on April 6th, 1869, in the district of Mandla, Central Provinces. The nest contained a single egg, which was destroyed by the fall. The nest is a most wonderful little structure. It is a very shallow half-saucer, composed of thin flakes of bark, gummed, probably by the bird's own saliva, against the side of a tiny horizontal branch. The nest is nowhere more than  $\frac{1}{8}$  inch in thickness, is at most  $\frac{1}{2}$  inch deep in the deepest part, and can be exactly covered by a half-crown. The parent bird, though slender, is fully 10 inches in length, and consequently the bird when sitting across the nest and the tiny branch to which it is attached completely hides the nest, and no one would suspect that there was any nest there at all.

Mr. Thompson at the time wrote to me as follows:—" *Dendrochelidon coronata* builds a wee bit of a nest with small chips of bark, a few feathers, and all glued together with inspissated saliva. The nest is placed on the side of a horizontal branch, and is entirely filled up with the solitary, rather largish, white oval egg. The bird looks for all the world as if she were resting on the branch,

and no amount of looking from underneath would show you that there was a nest under her. The particular nest I send you was placed in a *Boswellia thurifera* tree at about 12 feet from the ground. It is very small and saucer-like, composed of the exfoliated flakes of bark of the tree (*Boswellia thurifera*) mixed with one or two feathers, all cemented together by the inspissated saliva of the bird."

Mr. R. Thompson has recently sent me another nest and egg of this species. He says:—"This nest was found in the Ahiri forests of the Chanda District, Central Provinces, on the 7th of May last. The nest was attached to a dead branch of the *Boswellia thurifera*, at a height of about 20 feet from the ground.

"It is not in the high or deep forest that the bird breeds, but in scattered jungle, usually covering low stony hills and ridges. The nest in this particular case was in a tree quite by itself, with only a few others in the neighbourhood scattered about here and there.

"My attention was directed to the male bird, who was trying his best to dislodge a Dove from a tree near to the one on which I ultimately found the nest. I knew that there must be a nest somewhere near, and soon caught sight of the female sitting transversely across a thin dead bough, the tiny nest, glued on to the side of this branch, being as usual scarcely perceptible from below. I have seen two other nests of this Swallow in this neighbourhood each containing a tolerably well-fledged young one. The nests in these instances also were placed on *Boswellia* trees. The present nest contained the single egg now sent, and is precisely similar to the one I found in Mundla in 1869. To the best of my belief they never lay more than one egg in the nest."

The stem to which the nest was attached is about 0.8 inch in diameter, against the side of this the nest is glued, so that the upper margin of the nest is on a level with the upper surface of the branch.

The nest itself is half of a rather deep saucer 1.75 inches in diameter, and about 0.6 in depth internally. The nest is entirely composed of thin flakes of bark, cemented together by the bird's saliva, and is about an eighth of an inch in thickness.

The egg is a very elongated oval, obtuse at both ends, and with little or no gloss. It is white with a slight greyish-blue tinge, and measures 0.94 in length by 0.61 in breadth.

Captain Horace Terry was fortunate enough to secure the nest and egg of this Swift on the Pulney Hills. He says:—"I found this bird fairly common on the slopes of the Pulney Hills in 1883. One day (7th April) I went down the slopes of the Pittur Valley to see what I could get in the way of birds and eggs, and noticed several of these Swifts about, and looking up at a large tree, with no branches near the ground, and with a sort of gum oozing out in places, I saw a bird near the top at the extremity of one of the branches. I looked at it through my glasses and saw it was a Crested Swift. With some little trouble I frightened it off the tree; it took a short flight and then returned to its original position,

and then I noticed what I took to be its nest. Under promise of a large reward I induced a native to go up for it. It was as nasty a looking tree to climb as one could well imagine. The nest was right at the end of a dead branch near the top. However, the man being once started took a sensible view of it and went right up, but of course he could not get quite close to the nest; but by tying a bamboo under the branch, cutting it through and then drawing it in he eventually got hold of the part where the nest was. It was a tedious business, but at last he got it down, and I was very glad when I safely got hold of the nest and egg. The nest was made of a few bits of bark and feathers gummed on to the branch, and apparently, in addition to the saliva of the bird, some of the gum of the tree itself had been used.

"It was just large enough to hold the one egg, which was of a glossless white, an elongated oval, the same at both ends, and not at all like a Swift's egg. It was much incubated."

About two years ago I found a nest of this species in the Darjeeling Terai in May placed exactly as above described, but both nest and egg were smashed, and the lad who went up for them was nearly killed by the bough breaking just before he reached the nest. The egg was very long and pure white, and, as far as I could measure the fragments, nearly 1 inch in length.

I have as yet obtained only one single entire egg of this species, and this I owe to Captain Mitchell of Madras. It is in colour a pure dead spotless white, and in shape a very long almost cylindrical oval, but slightly pointed towards the lesser end.

It measures 0.85 by 0.55 inch, and is much smaller than the one I saw.

## Family CAPRIMULGIDÆ.

**Batrachostomus moniliger**, Layard. *The South-Indian Frog-mouth.*

*Batrachostomus moniliger*, Blyth, *Jerd. B. Ind.* i. p. 189; *Hume, Cat. no. 105.*

Mr. Bourdillon, writing from Mynall in Travancore, gives me the following interesting account of the nidification of the South-Indian Frog-mouth:—

"The nest was brought to me one evening by a coolie who had been working in the jungle. The nest was composed of vegetable down neatly and compactly interwoven with pieces of dead leaves, fragments of bark and dry wood, and one or two pieces of lichen. In shape it is a sort of disk about  $2\frac{1}{2}$  inches broad and  $1\frac{1}{4}$  deep, the upper surface being slightly hollowed out.

"The young one, partially fledged, was unmistakably a Frog-mouth from the colour of his plumage and bill and huge gape. On receiving the nest I at once went with the man, and, restoring it to its original position, sat down to watch.

"The chick (I quote from my notes) was much pleased at finding himself in his old quarters, and repeatedly shook himself as if he could not at first settle down into a comfortable position ; this shaking being attended with some danger, as once or twice the bird seemed within an ace of rolling out of the nest. At intervals of about ten minutes it uttered a feeble chirruping call, not unlike an Ice-bird at a distance. As darkness increased its cry was more frequent and became a single chirp. I watched till night closed in and it became pitch dark without seeing anything of the old bird, though once something which might have been either bird or bat flitted past.

"Next morning I returned some time before sunrise, and in the moonlight had a good view of one of the old birds seated on the nest. It was in a very peculiar position, more lying down than sitting, with its head well up in the air. The nest was not 15 feet from the ground in a fork of a sapling, apparently without any attempt at concealment, so that I was able to approach very close to the bird, which without moving merely opened its large eyes to stare at me. Now comes the worst part of the story. I was so anxious to secure the specimen that I determined to shoot it on the nest ; accordingly I retired as far as possible and fired. The result, owing to intervening bushes, being that to my great disappointment the bird went off into the jungle hard hit and was lost. Thinking at first the bird could not possibly have escaped I searched about for it, and at the foot of the small tree where the nest was I found the remains of an egg. These I have kept and will send with the nest, as I at least have no doubt that they originally enclosed the young Frog-mouth. You will see from these fragments that the egg of the bird is probably pure white, almost round, of thin texture, and with a smooth glossless surface."

The nest of this species taken at Mynall, Travancore, by Mr. Bourdillon is very similar to that of *Batrachostomus hodgsoni*, but is smaller and thicker, slightly oval in shape, 2·6 inches in length by 2·3 in width, and a full inch in depth. Instead of moss, a few fragments of dead leaves are incorporated, but the material is chiefly a soft felt-like mass, precisely similar in texture to that used by *B. hodgsoni*, but greyish white instead of brown. It is a mere pad with a shallow depression on the outer surface, a broad groove on the lower showing where it has rested on the upper surface of a nearly horizontal bough.

*Batrachostomus hodgsoni* (G. R. Gray). *The Sikkim Frog-mouth.*

*Otothrix hodgsoni*, G. R. Gray, *Jerd. B. Ind.* i, p. 190; *Hume, Rough Draft N. & E.* no. 106.

Mr. Hodgson figures a young bird of the Sikkim Frog-mouth seated on a broad pad-like nest of moss and lichen, placed on a horizontal bough of a tree close to its junction with the trunk. He

notes on the reverse of the plate that the female with young and nest were obtained on the 20th May, 1856, behind Darjeeling, towards the great Runjeet, at an elevation of between 3000 and 4000 feet. He adds, "young like adult, but duller hues; nest nearly flat; a soft mass of lichen and moss overlaid with a soft downy vegetable substance blended into a felt-like mass."

To Mr. Mandelli I am indebted for two nests of this species. The first was found in the neighbourhood of Namtehu in Native Sikhim on the 1st of June, and it contained two hard-set eggs, one of which was broken by the shot, and the second Mr. Mandelli most kindly sent me. The other nest was found in the same neighbourhood on the 26th May, and contained a single egg ready to hatch off. Both nests were similarly placed, on more or less bare horizontal branches of medium-sized trees at heights of about 10 feet from the ground. Both nests are precisely similar to each other, and very closely resemble Mr. Hodgson's drawing. They are small circular pads barely  $3\frac{1}{2}$  inches in diameter, and at thickest about  $\frac{3}{4}$  of an inch thick. The upper surface slightly hollowed into a saucer-like shape, and the lower surface hollowed out into a broad groove, the pad having manifestly rested on the upper surface of a horizontal bough 3 or 4 inches in diameter. The lower surface of the pad where it was in contact with the bough has a thin coating of moss; the whole of the rest is a compact brown felt-like mass, very soft and downy, composed entirely it appears to me of excessively fine moss rootlets, but withal as soft as the underfur of any little mammal.

The egg, strange as it may appear, is pure white; a moderately elongated oval, and almost entirely devoid of gloss. The female was shot on the nest in each case, and one of the two also sent me by Mr. Mandelli is a typical *Batrachostomus hodgsoni*. It will be seen that the egg of *Batrachostomus moniliger* is almost white.

The egg measured 1.04 by 0.76.

Of two other eggs of this species in my collection, one is a very long narrow oval, a good deal compressed towards the small end; the other egg is considerably shorter and broader; the shell is of a dull, glossless white and very thin. The eggs were found on the 2nd May, and measure 1.14 by 0.63 and 1.03 by 0.65.

### *Caprimulgus indicus*, Lath. *The Jungle Nightjar*.

*Caprimulgus indicus*, Lath., *Jerd. B. Ind.* i, p. 192; *Hume, Rough Draft N. & E.* no. 107.

Widely distributed as is the Jungle Nightjar, I have very few notes to record regarding its nidification.

Colonel Butler writes:—"The Jungle Nightjar is tolerably common at Mount Aboo, and breeds upon the hill in all probability about March, April, and May, as I observed and shot young birds which had quite recently left the nest in the middle of June.

Mr. Rhodes W. Morgan, writing from South India, says:—"This Nightjar breeds in all the forests and thick brushwood jungles

of Southern India. Its monotonous note may be heard the livelong night in the breeding-season, which is in March. The eggs are generally two in number, and are placed in a slight depression in the ground under some low bush. The egg is rather a pretty one, being thickly blotched with faint lilac and reddish brown on a salmon-coloured ground. Length 0·98 inch, breadth 0·58."

Mr. C. J. W. Taylor writes from Manzeerabad in Mysore:—  
"Very common. Procured eggs on the 10th April, 1882. Eggs deposited on the bare ground after the grass has been burnt."

I have as yet only authentic eggs of it taken in April in the Central Provinces by Mr. F. R. Blewitt, and below Mussoorie in May by Captain Hutton. These birds lay only two eggs and make no nest, but lay in a slight depression of the ground, under some low bush.

The eggs sent me by the above-named gentlemen are undistinguishable from some of those of *C. kelaarti* sent me from the Nilghiris and from Raepore. I have never taken any eggs of this species myself and indeed I am, for the most part, dependent, so far as the eggs of the *Caprimulgidae* go, on correspondents. I have never accepted eggs unless sent me along with skins of the birds to which they were said to belong; yet, notwithstanding this, I confess that I am far from certain that no mistake has in any case occurred. In regard to the present species I may mention I have as yet only four eggs, all very much of the same type and size. They are long ovals, somewhat cylindrical, and one of them slightly pyriform. The shell is fine and has a fair amount of gloss. The ground-colour is a pale salmon-pink, in one egg slightly paler and more creamy. They are pretty thickly but irregularly blotched and streaked with pale brown: in one egg a purplish, in the others more of an olive-brown, and also with faint underlying spots and clouds of more or less pale inky purple.

They vary from 1·15 to 1·25 inch in length, and from 0·86 to 0·9 inch in breadth, the longest egg being the narrowest, and the shortest the broadest.

*Caprimulgus kelaarti*, Blyth. *The Nilghiri Nightjar.*

*Caprimulgus kelaarti*, Blyth, *Jerd. B. Ind.* i, p. 193; *Hume, Rough Draft N. & E.* no. 108.

This supposed species, the so-called Nilghiri Nightjar, breeds throughout Southern India and the more wooded portions of the Central Provinces from the latter end of February to August. In the Nilghiris March seems the favourite month, in the Ghâts of the Central Provinces April, but Mr. Blewitt took them in Raepore as late as August. Mr. Davison tells me that this species "breeds on the Nilghiris in the latter end of February and the earlier part of March. There is no pretence whatever of a nest, the eggs being merely placed on some slight natural depression under a bush or tuft of grass. Occasionally a rather strange situation is chosen for the eggs; and they are laid in the centre of

some small heap of ashes produced by the *Burgas* (*Badagas*) burning weeds in their fields. The eggs are two in number, of a fine salmon-coloured ground, marbled with a purplish brown, which is very much toned down, appearing as if beneath the surface of the shell."

Miss Cockburn, writing from Kotagherry, remarks:—"This Nightjar never builds a nest, but lays her eggs (generally two in number) on the bare ground, and occasionally on a rock, where there is not the slightest appearance of anything resembling a bush to shade the bird from the scorching rays of the sun while engaged in the work of incubation. She evidently prefers heat, and for this purpose chooses very warm localities. This bird is often contented with only *one* egg, which it is supposed to have the instinct to remove to another place, if looked at frequently by man. The business of hatching is apparently left entirely to the female, as she alone is seen near the eggs. The Nightjar's eggs are found in the months of February, March, and April. Some of them are perfectly oval, others are thicker at one end than the other. I know of no bird's eggs whose colours fade so very much if kept after being blown. When first taken, the prevailing hue is a beautiful salmon colour with large blotches of a darker shade; but in a short time they lose their freshness."

Mr. R. Thompson says:—"This Nightjar is found over all the well-wooded Ghâts of the Central Provinces. I found the eggs in April, two in each case, laid on the bare ground under a bush; the hen when flushed usually flew straight up into a tree. The eggs were fleshy white, blotched with purplish-pink spots. Although a good deal smaller, they were of the same shape as those of *C. albinotatus*."

I am indebted to Mr. F. Bourdillon for an egg of this species, taken on the Assamboo Hills, which at the extreme south of India divide Travancore and Tinnevelly. He says:—"We obtained two eggs, measuring respectively 1.12 and 1.17 by 0.87, on the 18th Feb., 1872. They rested in a slight nest of dry fern-leaves, which was placed on the ground under a rock. The bird is a very common one and goes by the name of the 'Ice-bird.' It appears about sunset and on bright moonlight nights, and may be heard at all hours until dawn. I have even heard it between 9 and 10 A.M., though what should keep it awake so late I do not know."

Mr. Rhodes W. Morgan, writing from S. India, says:—"Like the preceding species, this breeds in March. The eggs are lighter in colour, being of a pinkish buff, blotched with pale violet-brown. On one occasion I found the eggs laid on a heap of ashes. The dimensions of one in my collection are 1.11 inch in length by 0.82 in diameter across."

The breeding-season of this species in Ceylon appears to be in March and April.

Some of the eggs of this species which have been sent me from the Nilghiris by Miss Cockburn, Mr. Carter, and Mr. Davison, and likewise from Raepore by Mr. F. R. Blewitt, agree precisely with

the eggs of *C. indicus* already described, but one has a much brighter salmon-pink ground, and has both the primary purplish-brown and the secondary paler purple markings much better defined and brighter; and, again, three or four of the eggs have more of a creamy tinge on the ground-colour, and have both the brown and the pale purple markings very faint and cloudy. As regards size, shape, and gloss, these eggs are much the same all through. I do not myself believe that *C. kelaarti*, as obtained in Southern India at any rate, and *C. indicus*, are really specifically distinct; and hence I am not surprised to find that the eggs attributed to both races are practically identical.

The eggs, of which I have a large series, vary from 1.08 to 1.23 inch in length, and from 0.8 to 0.9 inch in breadth; but the average is 1.15 by 0.86 inch.

**Caprimulgus albinotatus, Tick. The Large Bengal Nightjar.**

*Caprimulgus albonotatus, Tick.,* *Jerd. B. Ind. i, p. 194;* *Hume, Rough Draft N. & E. no. 109.*

The Large Bengal Nightjar breeds from March to May pretty well all over the better-wooded portions of Continental India, but most plentifully in the low warm valleys of the Sub-Himalayan ranges.

Like the rest of the family it makes no nest, and lays two eggs upon the bare ground, as a rule in some sheltered situation.

Mr. R. Thompson writes:—"The birds begin pairing as early as March, when they are very noisy and restless, flitting about from place to place, attracted by each new call of a rival bird of either sex, a call which may be either one of love or defiance.

"The eggs, always two in number, and of a salmon-colour, blotched with pink and brown, are laid on the bare ground under shelter of a bush, stump, or stone.

"The eggs are long, almost cylindrical, both ends being of the same size. About the end of May the young birds are hatched, covered with down, and are quite helpless and unable to shift their position until able to fly—a power which is quickly given them, the rapidity of their growth being commensurate with their utterly helpless and exposed condition whilst nestling on the bare ground.

"This and *C. asiaticus* are common to all the lower warm valleys of the Sub-Himalayas. I have found sometimes three and four nests within a small space of jungle (often the dry bed of a water-course), the shelter of a high bank, or in a coppice of young trees. Though quarrelsome and restless when pairing, after that they appear to sober down and many live together in near proximity. They show a peculiar fondness for certain localities, where large numbers will be found, whilst in other places, quite as favourable as it would appear to us, not a bird will be met with."

Colonel Tickell, who seems to have possessed the remarkable faculty not shared by ordinary mortals of discriminating the sexes

of eggs, said long ago of this species :—“ Makes no nest ; eggs laid on the bare ground in bush-jungle ; in general two ; shape blunt, and both ends nearly equal ; male egg  $1\frac{7}{8}$  by  $1\frac{5}{6}$  inch, pale fleshy clay-colour, sprinkled with patches of darker brownish red ; female egg  $1\frac{3}{16}$  by  $\frac{7}{8}$  inch, paler and redder.”

“ Of this species,” remarks Captain Hutton, “ which is a summer visitant at Mussoorie, I took two eggs, at an elevation of 5000 feet, on the 19th April, from the bare ground, beneath bushes on the side of a hill, the colour being a rich cream-white, with darker blotches of reddish brown or clay colour ; of one the diameter was  $1\frac{1}{4}$  by  $\frac{7}{8}$  inch, the other was somewhat smaller ;” and Captain Beavan tells us that “ in Maunbhook, where it is more frequently heard at night than seen, I have procured the eggs at the end of March or the beginning of April ; they are as described by Captain Hutton.”

The eggs of this species are, as a rule, much paler than those of any other Indian species with which I am acquainted.

Some specimens that I possess of this bird’s eggs I owe to Captain Hutton, who vouches for their authenticity. They are long, slightly cylindrical ovals, apparently somewhat smaller than those of *C. europaeus*. The ground-colour is a pale creamy or yellowish-stone colour, and they are streaked or blotched with very pale yellowish and purplish brown. Many of Captain Hutton’s eggs have, he informs me, faded since they were collected, so that the above description may scarcely represent the colour of the fresh egg. Other specimens received from Captain Hutton and elsewhere, said to belong to this species, resemble in shape and size those already described, but the ground-colour is almost a china-white, and the markings, which resemble those of the eggs first described in character and shape, are mostly a pale lilac, intermingled with some brown, and altogether, though paler eggs, remind one very much of the European Goatsucker’s egg.

These eggs, if, as I have no reason to doubt, they really belong to *C. albinotatus*, differ *in toto* from all the other Indian Goatsuckers’ eggs that I have seen in their almost purely white ground, with only the faintest possible lilac tinge ; they also average considerably larger than those of the foregoing species.

But the eggs are not always of this pale type. I have seen a pair taken by Captain Cock at Dhurumsala which are a beautiful delicate salmon-pink, marbled cloudily over with pale purplish brown, part of the markings appearing as if below the surface of the eggs.

Colonel G. F. L. Marshall tells me that he “ found a nest of *C. albinotatus* at Bheem Tal, at an elevation of about 4000 feet above the sea. There were a good many of the birds about, keeping in some small tree-jungle on the north side of a small hill. I only found one egg (shooting the parent bird from off it, after watching for about half an hour), and it was laid on the bare ground in a little cleared spot among dead leaves at the root of a shrub and at the foot of a low bank, which, between them, completely shaded it.

The egg was a pale salmon-colour, clouded with a darker shade of the same hue; it was of the same cloudy type as eggs of *C. asiaticus*, and not boldly streaked like those of *C. unwini*, Hume, or *C. europaeus*."

In length these eggs vary from 1.08 to 1.3 inch, and in breadth from 0.85 to 0.95 inch; but the average of a large series is 1.2 by 0.89 inch.

**Caprimulgus jotaka**, Temm. & Schleg. *The Japanese Nightjar.*

*Caprimulgus jotaka*, *T. & S.*, *Hume, Cat.* no. 107 bis.

Colonel Godwin-Austen gives the following account of the nesting-place and eggs of the Japanese Nightjar in the Naga Hills:—"I shot this bird near the Umshirpi falls on the 29th May. It got up off the path and immediately settled again about 10 yards off on the open path; on again putting it up, it did the same. Captain Badgley, who was walking behind me, called out that he had found the eggs. I then put the bird up a third time, and brought her down. The eggs were laid close in under the rock on side of the path, lying on the bare ground, with no signs of anything in the way of preparation for them or the young. The two eggs are of a dull white, blotched with three shades of umber and one shade of ashy brown: in the one they are distributed pretty evenly throughout, and this is symmetrical in form, the minor axis being in the centre of the length; in the other the markings are mostly confined to the larger end and the shape is rounder. They measure 1.22 by 0.88 and 1.19 by 0.91."

**Caprimulgus macrurus**, Horsf. *The Malay Nightjar.*

*Caprimulgus macrourus*, *Horsf.*, *Jerd. B. Ind.* i, p. 195; *Hume, Cat.* no. 110.

Major C. T. Bingham, writing of the nidification of this Nightjar in Tenasserim, says:—

"This is the commonest Nightjar, and, as Mr. Davison remarks (S. F. vol. vi. p. 58), its incessant call of tok-tok-tok is very annoying at night.

"It is common in the Thoungeen valley even in dense evergreen forest. On the 15th March, 1879, while tramping back to my camp pitched on the bank of the Queebawchoung, a tributary of the Meplay, I arrived about dusk at a dense bamboo-forest just above my tent. There being lots of fallen bamboos, I had to carefully pick my steps in threading my way through, and so doing all but trod on a female of the above species; she flew up, and I saw lying on the dry bamboo-leaves a couple of blunt oval eggs, pinkish stone-colour, with washed-out purple blotches, clouds, and spots of various shades.

"Both these I found slightly set, and a third one half formed in

the oviduct of the female which I shot. I mention this circumstance, as I have never found more than two eggs in any Nightjar's nest.

"Subsequently, on the 15th March, 1880, I found a second nest with two eggs precisely similar, which measured 1.16 by 0.85 and 1.23 by 0.87.

"The first two eggs measured 1.2 by 0.9 and 1.15 by 0.89.

"On the 19th April, near the foot of the Dawna Mountains, Thoungyean side, I found two fresh eggs of this species, flushing the bird and shooting it. There was no nest, and the eggs were laid on the bare ground at the foot of a bamboo-bush. They are stony pink, dimly clouded with obscure purple blotches, and measure respectively 1.18 by 0.89 and 1.19 by 0.89."

The eggs are of the usual Nightjar shape, very regular, somewhat cylindrical ovals, with both ends precisely, or almost precisely, alike. The shell is very fine and smooth, excessively close-grained, but very thin for the size of the egg. In some specimens it has a fine gloss, in others it is much less conspicuous. The ground-colour is a delicate creamy pink, and it is everywhere rather thinly spotted, streaked, clouded, and marbled with very pale, somewhat brownish purple, and very pale subsurface-looking inky grey. Sometimes the brown has no tinge of purple in it; in some eggs the markings are pretty equably distributed; in others they are most abundant in a zone near one end all round the middle.

The eggs, of which I have now ten, measure from 1.15 to 1.29 in length, by 0.79 to 0.91 in breadth.

**Caprimulgus andamanicus, Hume. *The Andaman Nightjar.***

*Caprimulgus andamanicus, Hume; Hume, Cat. no. 110 bis.*

I myself only once met with the Andaman Nightjar, of which we shot a single specimen, a male, on Jolly Boys, an island in Macpherson's Straits, at the south of the South Andaman.

Mr. Davison remarks:—"I myself never saw this species in the vicinity of Port Blair, though I frequently heard its note of tok, tok, tok, during the night; but on a small island near Stewart Sound, between North and Middle Andaman, I saw a pair of them; they rose off the ground, flew low for a few yards, and then squatted, always placing a bush or stone between them and me. I followed them about for some time, but although I got a couple of snap shots I failed to secure a specimen. At Port Mouat, on the 12th April, one of my men shot a female as she flew off her nest; the eggs, two in number, were laid at the base of a stone in a slight natural depression among the dead leaves, some distance in the jungle. I did not see or even hear the note of any *Caprimulgus* on any of the islands of the Nicobar group."

The eggs are the most beautiful Nightjars' eggs I have ever seen, and differ from those of any other Indian species with which I am acquainted. In shape they are very regular ovals; one of them only slightly cylindrical.

The ground-colour is a delicate pale salmon-pink, and they are mottled and streaked, and ornamented with zigzag and hieroglyphic-like lines of a darker and somewhat purplish pink. They measure 1.07 and 1.13 in length, and 0.85 in width.

**Caprimulgus atripennis, Jerd. The Ghât Nightjar.**

*Caprimulgus atripennis, Jerd. ; Jerd. B. Ind. i, p. 196.*

*Caprimulgus spilocircus, Gray, Hume, Rough Draft N. & E. no. 111.*

Two eggs sent me with an undoubted skin of the Ghât Nightjar, from the Nilghiris, by Miss Cockburn are more elongated ovals than those of any of the other species. They have the usual gloss, have a pale somewhat creamy-pink ground, and are very faintly streaked and mottled over almost their entire surface with the palest possible reddish-brown and purple. They are decidedly smaller than those of the preceding species, and I think quite as small, and on the whole more elongated than those of *C. asiaticus*.

They were taken on the 10th May near Kotagherry, and measure 1.13 by 0.72 inch, and 1.01 by 0.74 inch respectively.

“In the west of Ceylon,” says Colonel Legge, “the Jungle Nightjar breeds during the latter part of the dry season and the commencement of the monsoon rains in April and May. It lays two eggs in a slight depression in sandy ground, beneath the shelter of a shrub; they are of a buff ground-colour, and very sparsely spotted with very dark sepia-brown, rather roundish blots.”

Mr. H. Parker remarks:—“A solitary egg in my collection measures 1.12 inch by 0.81.”

**Caprimulgus unwini, Hume. Unwin's Nightjar.**

*Caprimulgus unwini, Hume ; Hume, Rough Draft N. & E. no. 111 bis.*

I described this species, Unwin's Nightjar, in the 'Ibis' for 1871, p. 406. I had then only two specimens; several have since been procured in the far north-west. Colonel Marshall, writing from Murree, says:—“We found three nests of this bird on the bare ground in the valleys; the eggs are perfect ovals, greyish white, covered with differently shaded blackish blotches, being 1.15 long and 0.8 inch broad. Breeds in May, about 5000 feet up.”

Lieut. H. E. Barnes, writing from Afghanistan, says:—“Not uncommon, and breeds in May, as I obtained a young bird barely able to fly about the end of that month.”

The eggs of this species are as usual elongated ovals, almost always a good deal compressed towards the small end. The shells are very fine and compact, and seem always to have a fine gloss. The ground-colour appears to be typically white, and in the most characteristic form of markings the egg is pretty thickly mottled

all over with grey, and then above that more sparsely mottled with a pale sepia-brown, slightly yellowish in some specimens ; but in some eggs the mottlings are so fine and indistinct that unless very closely looked into the egg appears to be of a uniform greyish-cream colour, and indeed the extent, size, and comparative feebleness of the markings vary very greatly in different specimens, but the character of the egg never varies, always a very glossy, more or less pale stone-grey egg, with in about half the eggs more or less conspicuous pale sepia marblings.

**Caprimulgus asiaticus, Lath. The Common Indian Nightjar.**

*Caprimulgus asiaticus, Lath.,* *Jerd. B. Ind.* i, p. 197 ; *Hume, Rough Draft N. & E.* no. 112.

The Common Indian Nightjar, as Jerdon calls it (though I should say that it was less common than either *C. indicus* or *C. monticulus*), breeds pretty well throughout the plains of Continental India, ascending in the spring and summer the lower ranges of the Himalayas to the height of 5000 or 6000 feet. April and May are the chief breeding months, but I have taken the eggs in July, and so has Mr. F. R. Blewitt, both at Saugor and Raepore.

Mr. R. Thompson writes :—“ Breed in May. They are less choice in their selection of ground for laying their eggs on. I have found their eggs, two in number, in a quite unsheltered spot in the middle of a dry pebbly nullah. At another time on a large open spot under a large tree, and sometimes at the base of a dead wall.

“ The eggs are long, cylindrical, and equal at both ends. The colour a deep salmon, with bright pink blotches intermixed slightly with earthy brown. The eggs are about one-third smaller in size than those of *C. albinotatus*.”

Writing from Dhurumsala, Major Cock says :—“ Found a nest on the ground with two eggs ; had watched the bird near the place for some days before, and one day saw it fly up near a bank in a thick dark piece of jungle. Searched about, and in a depression of the ground among some dead oak-leaves found the eggs ; they were both the same shape, but varied very much in size. The bird does not remain with us during the winter, but comes up about April and departs about August ; may often be seen in the evening perched on a dead bough on the top of an oak ; in the daytime always found on the ground.”

And he added :—“ Breeds at Sitapur in March, April, May, and June, among low scrub-jungle, laying its two eggs close to the edge of some small bush or other jungle ; no nest, not even a depression in the ground, is the rule in the plains. The bird sits very close and is hard to see ; unless you put her up by walking over her you will not find the eggs ; the eggs themselves, from their colour, would attract the eye at once were they not covered by the bird.”

Colonel Butler tells us:—"Two fresh Nightjar's eggs were brought to me on the 29th July this year (1876). They were laid of course on the bare ground and in the neighbourhood of Deesa. The colour was pale pinkish cream or salmon, marked with reddish-brown irregular streaks and spots, underlaid with numerous faint blotches of dark and light inky purple or lilac. I fancy they belong to this species, as we only have two other Nightjars in this neighbourhood, *C. mahrattensis* and *C. monticulus*. The eggs, I think, are too large for the former, and the latter I do not think breeds here, as they are absent all the hot weather, and do not arrive until about the third week in July."

He subsequently added:—"Eggs obtained by me of this species subsequently leave no doubt whatever of the identity of those I got at Deesa. Mr. J. Davidson sent me two fresh eggs taken at Dhulia, Khandesh, 8th September, 1880."

Mr. J. Davidson, writing on the birds of Western Khandesh, says:—"It breeds abundantly all round Dhulia in July, August, and the beginning of September."

Mr. C. J. W. Taylor informs us that he took the eggs of this species at Manzeerabad in Mysore on the 11th April.

"The breeding-season on the western side of the island," says Colonel Legge in his 'Birds of Ceylon,' "is during the first three or four months of the year."

The eggs are long, somewhat cylindrical ovals, slightly pointed towards one end, with a ground-colour varying from a pinkish stone-colour to a deep salmon-pink, blotched, clouded, spotted, and streaked with different shades of pale reddish and purplish brown, with faint underlying inky-purple clouds and spots. The eggs vary somewhat in size, but the largest are scarcely half the dimensions of those of the European Nightjar, and they average much smaller than any of our Indian Goatsuckers except *C. atripennis*. The eggs have been obtained by several of my contributors in different parts of India, and little doubt can be entertained either as to their authenticity or as to the normal type of coloration in this species being that above described. The eggs have a faint gloss. The eggs of this species are perhaps, as a rule, more brightly salmon-coloured than those of any other of our Indian species with which I am acquainted.

In length they vary from 0.98 to 1.1 inch, and in breadth from 0.73 to 0.83 inch; but the average is about 1.04 by 0.77 inch.

### *Caprimulgus mahrattensis*, Sykes. *Sykes's Nightjar.*

*Caprimulgus mahrattensis*, Sykes, *Jerd. B. Ind.* i, p. 197; *Hume, Cat.* no. 113.

Colonel Butler writes regarding this species:—"Mr. Doig found two nests in the E. Narra, Sind, on the 2nd May, 1878, containing fresh eggs. On revisiting the place on the 22nd July, our men found three or four more nests containing fresh eggs. The nest

simply consists of a slight depression in the ground, usually in low thick tamarisk-jungle on *kulher* (salt) ground. The eggs, two in number, remind one more of the eggs of *Pterocles exustus* than any other eggs I know, but the markings are of a more marbled character. The ground-colour is greyish white, blotched, or perhaps marbled would be a better word, with primary markings of greyish or greenish olive, and secondary markings of pale inky grey. Some eggs are much more distinctly marked than others, but they all fade to a certain extent after they are blown.

“Mr. Doig had fresh eggs brought to him also on the 22nd and 28th June.”

Mr. Scrope Doig writes from the Eastern Narra in Sind:—“This Nightjar is the only permanent resident of the genus in these districts; *G. unwinii* appears in September, as a migrant, but stays for a very short period. The eggs of *C. mahrattensis* are always two in number, of a light pale stone ground-colour, with large blotches of neutral tint; these latter fade considerably after the egg is blown. The nest, which is merely a slight hollow scraped in the ground, is nearly always situated on a bare piece of *kulher* ground, sometimes under a small bunch of grass, at others under a dry bramble, or at times right out in the open without any attempt at concealment. The size of the eggs varies from 1·1 to 1·2 in length, and from 0·75 to 0·85 in breadth, the average of twelve eggs being 1·13 in length and 0·8 in width.”

He adds:—“On the 20th November, 1878, one of my men said he found a nest containing two eggs of this Nightjar, but that unfortunately, while crossing a bit of salt ground, he fell and broke them. The same man has before got me eggs of this bird, so that I conclude he really got them. It seems an unusual time for them to be breeding.”

The eggs of this species are moderately elongated ovals, less cylindrical than those of many of its congeners, and more or less pointed towards the small end. The shell is extremely fine and smooth, and has a decided gloss; the ground-colour is greyish white, marbled and blotched with very pale grey or greyish lilac, and over this more or less spotted and blotched with pale sepia-brown, in some cases extremely pale and with the least possible olivaceous tinge.

The extent and intensity of these primary brown markings vary very much in every specimen; they are pale in all, but in some they are barely traceable. In some eggs the grey markings occupy the greater portion of the surface of the egg, in others the ground-colour has the faintest ivory tinge.

Numerous eggs measure from 1·08 to 1·21 in length by 0·76 to 0·85 in breadth.

**Caprimulgus monticulus, Franklin. *Franklin's Nightjar.***

*Caprimulgus monticulus, Frankl.,* *Jerd. B. Ind.* i, p. 198; *Hume, Rough Draft N. & E.* no. 114.

Franklin's Nightjar breeds from April to August, according to locality, throughout the lower ranges of the Himalayas, the Sub-Himalayan forest and jungle-tracts, and forest and hilly regions of the Central Provinces and other parts of India.

It lays normally two eggs (at times a single one, hard-set, may be met with) on the bare ground, as a rule, in some shaded spot, where it can be concealed.

The eggs are of the usual type of our Indian Nightjars, long cylindrical ovals, varying a good deal in size, but little in shape. They have a fine gloss, more so I think than our Indian Nightjars. The ground-colour is, I think, as a rule, a delicate cream-colour, slightly tinged with pink, spotted and thinly blotched with very pale purple and pale brown. I have never taken these eggs myself, and cannot, therefore, in every case be as certain as I should wish of their authenticity.

An egg, however, received from Mr. Blewitt from Raepore, differs *toto caelo* from those above described, at least so far as colouring is concerned. It has a rich salmon-pink ground, richer and deeper than that of any other Goatsucker's egg that I possess, and is pretty thickly clouded and streaked with only slightly brownish red.

Dr. Jerdon says:—"I have found the eggs of this species; they are like those of *C. asiaticus*, but larger and with less of the salmon hue, more of a stone colour, and with very pale clay-brown blotches."

Lieut. H. E. Barnes, writing from Rajpootana, says:—"I found two eggs of Franklin's Nightjar on the 15th June. They were deposited on the bare ground, under the scant shelter afforded by a small tuft of grass."

Mr. Davison says:—"Close to Yeaboo (where are situated several hot mineral springs, from which the place derives its name, which signifies in Burmese 'hot-water') there is some forest similar to that which lines the road leading from Moulmein to Amherst. This forest is very scanty, being composed of moderate-sized deciduous trees, interspersed with thorny bamboos and brambly shrubs, but with little or no undergrowth; and in March, both at Yeaboo and along the Amherst road, this forest presented anything but a bright picture, most of the trees had lost their leaves, and these with large quantities of bamboo-leaves and dry and dead twigs lay scattered about; in places a surface fire had passed, leaving the ground black and burnt.

"It was in such a piece of forest that, on the 10th of March, I obtained a specimen of *Caprimulgus monticulus*, a female, which I shot off her eggs.

"There was no nest, the eggs being laid in a slight depression in the ground, at the root of a tree."

The eggs found by Mr. Davison are somewhat elongated but very perfect ovals, very obtuse at both ends. The shell is fine, and they have a fair amount of gloss. The ground-colour is a rich salmon-pink, and they are blotched, streaked, and mottled with dull red, which has a slight brownish tinge. Besides these primary markings, numerous clouds and marblings of pale inky purple or neutral tint are scattered about the egg; but in each egg they are most numerous about one end, where also the primary markings are most dense. Of these two eggs taken at the same time out of the same nest, one is more than a tenth of an inch longer than the other, though in breadth they differ only in one fiftieth of an inch.

The few eggs I have vary from 1.1 to 1.22 inch in length, and from 0.8 to 0.89 inch in breadth, but I have not a sufficient series to make sure that these limits are not exceeded.

***Lyncornis cerviniceps*, Gould. *The Burmese Eared Nightjar.***

*Lyncornis cerviniceps*, Gould, *Hume, Cat.* no. 114 bis.

Mr. W. Davison, writing from Tenasserim, says:—"On the morning of the 10th January, 1875, while passing through some thin tree-jungle, almost free from brushwood, close to the village of Malawoon, I flushed a *Lyncornis* from the foot of a large tree. The bird sat very close, not moving till I was within a couple of yards of her. On looking down at the spot from which she rose, I found one egg lying on the bare ground, without any attempt at a nest, or even depression to prevent the egg from rolling away, which it easily might have done, as the spot where it was laid was slightly raised above the surrounding level. A few of the bird's richly-marked feathers lay about the spot on which the egg lay, and a few inches all round was perfectly dry, while all the surrounding ground was quite wet with the dew of the preceding night, so that the bird must have sat on the egg the whole or greater portion of the night.

"The egg was quite fresh, so the bird probably lays more than one."

The egg of this species is, as might be expected, quite of the Nightjar type. In shape it is a long, somewhat cylindrical oval; the shell is fine and has a fair gloss, but when looked into closely exhibits a vast number of minute pores. The ground-colour is a pale delicate pinky cream-colour, and it is pretty thickly marked with large irregular blotches and splashes of very pale lilac-grey, looking much as if they lay beneath the surface of the egg.

This egg measures 1.65 by 1.18.

## Family CORACIIDÆ.

*Coracias indica* (Linn.). *The Indian Roller.*

*Coracias indica* (Linn.), *Jerd. B. Ind.* i, p. 214; *Hume, Rough Draft N. & E.* no. 123.

Both Layard's and Tickell's accounts of the nidification of the Indian Roller are nonsense; one says the eggs are full deep Antwerp blue; the other that they are greenish, profusely speckled with dark brown spots: of course they are really pure, glossy white. They *could not* in the first place be anything else, and I have taken scores myself, and so have Messrs. Brooks, Blewitt, Hutton, Thompson, Adam, Cock, and a dozen others, and no one ever yet saw this species lay anything but a white egg. They lay from the end of March right into July, but in Upper India the great majority of the birds lay in April and June.

They build in holes in trees, in old walls, in roofs, or under the eaves of bungalows; they sometimes make a good deal of a nest, of feathers, grass, &c., especially where the site they choose is not well closed in, but where they build in a small-mouthed hole there is usually a very scanty lining. I have found a nest in a large niche in an old wall, in which the birds had contracted the entrance with masses of tow, vegetable fibre, and old rags, but this is quite exceptional; and again I have taken the eggs from a hole in a siris-tree, in which there was not the smallest lining beyond a few fragments of decayed wood. I have never found more than five eggs in any nest, and four I take to be the normal number.

Mr. F. R. Blewitt says:—"I do not know exactly how long they continue breeding, but I have found the eggs in May, June, and a part of July. The nest is built in holes of trees and old walls of buildings; occasionally the Roller even breeds in the roofs of houses (as witnessed by me at Sultanpore). I have personally searched but two nests; the one, in the hole of a tree, had a very peculiar grain-like substance of a deep chocolate-colour, on which the eggs were deposited. The other, in a hole in an old wall, had some coarse and fine grass with feathers of sorts for the eggs to rest on."

"The regular number of eggs is four. In colour they are white, without any trace of spots, and their average length is 1.3 inch, breadth 1.1 inch. In shape they are oval."

Mr. R. M. Adam remarks that in the neighbourhood of the Sambhur Lake this species is "very common. I have taken its eggs during March, April, and May. On the 24th April I saw a pair making love near the Sambhur Fort, and on the 1st May I obtained the eggs of the same birds from a cavity in a neem-tree; one of

the eggs was a little set. Breeds in Oudh during April. On the 19th April I had five eggs brought from one nest."

Major Bingham says:—"At Allahabad the Roller breeds in April, May, and July; and at Delhi in May, June, and July. I have only twice had the luck to find eggs. Once in a hole in a wall, scantily lined with a few grass-roots and a feather or two, I took three fresh eggs on the 10th April. Secondly, from a hole that had evidently been once occupied by a Bank Mynah I took four hard-set eggs lying on the bare ground without a semblance of lining, on the 11th July."

At Lucknow Mr. G. Reid informs us this Roller is a permanent resident. "A pair of them made a nest in a hole in a neem-tree about 15 yards from the verandah of the house I live in, from which I obtained four white eggs on the 20th April."

Mr. Benjamin Aitken writes:—"You and your correspondents seem to have been very successful in getting the eggs of this bird, but I have little more than a series of disappointments to record in all my efforts to the same end. It beats the Lapwing hollow in concealing the whereabouts of its nest, and is far more aggravating from the assumed innocence of its intentions. I only once saw a Roller in Bombay, and it is not particularly common in Poona or in Madras; I did not see it on the occasions of my two visits to the hill-stations of Poorundhur and Sirgurh, and I do not think it is found at the stations on the top of the Bhore Ghat; it is, however, common enough at Enteshwur, a small hill-station four miles from Sattara, though I do not remember noticing the bird in Sattara itself. But in Berar the Roller is legion, and I am sure I could have found a mare's nest with half the time and trouble I spent in searching for a nest of this bird. There was one Roller which used to fly over our bungalow many times a day, with a great lump of food for its young. I felt certain at first of marking down this, but it was a vain confidence. I had only to show a corner of an ear out at a window or from under the verandah, and the bird would quietly turn to one side and take its perch on a tree, where it would have sat till nightfall, holding the insect in its mouth, if I had not withdrawn. But I did succeed at last. There was a tope of some seventy mango-trees standing in the middle of the plain about two miles out from the station, and in this tope, in May 1870, there could be no doubt a pair of Rollers had a nest. But the birds gave no intimation of such a thing. Every time I visited the tope, a moment or two after I got under the shade, I was met with the usual muffled cry with which these birds encourage themselves in patience, and, looking up, I could see Mrs. Roller sitting calmly on a bough as if she had never left her perch since the Flood. In vain I removed to the furthest point from which I could see her, and lay down as unconcerned as possible. The usual call every quarter of an hour was the only sign of life the Roller showed. Though I call her Mrs. Roller, I was of opinion at the time that the bird was the male; the female, I made sure, was safely ensconced in some hole, too wise to show herself by coming out. One morning, creeping into the tope even more

stealthily than usual, I heard the distinct flap of a wing just over my head, and the next moment there was the usual muffled call, and the bird was sitting on its perch. The next morning I returned in more hopeful spirits and entered the top with my eye fixed on the tree under which I was standing, when the bird flapped its wing : in a moment out from a hole flew Mrs. Roller straight to the usual perch, and gave her call. The hole contained three eggs, and was, I should say, the same hole in which the year before a pair of *Athene brama* had their nest."

Referring to Rajpootana in general, Lieut. H. E. Barnes writes:—“The Indian Roller or Blue Jay breeds during April and May in holes in trees, old walls, or under the eaves of houses. A little grass and a few feathers suffice for a nest.”

Messrs. Davidson and Wenden, writing of the Deccan, say:—“Common, but does not breed.” And the former gentleman informs us that this Roller breeds in the Satpuras, Akrani, Pimpalnir, and Nandurbar jungles in March and April.”

Mr. G. Vidal, writing from the South Konkan, says:—“Tolerably common inland in well-wooded country, but very much less so near the coast. Breeds in March.”

Mr. Rhodes W. Morgan, writing from South India, says:—“The Indian Roller breeds in March in holes of trees. The tamarind and banyan are generally chosen for this purpose. The eggs are usually two in number and of a pure and glossy white. There is no nest.”

Mr. C. J. W. Taylor writes from Mysore:—“After the burning of a jungle I noticed a single bird flying round and round a partially burnt tree. On approaching I noticed that the tree had a number of holes in it, so I got up, and at the top of an arm that had broken off short I found the dead body of a female resting on two eggs. She must have either been too frightened at the immense volumes of fire and smoke that rolled round her to escape, or, perhaps, ‘faithful to the last,’ had voluntarily perished on her eggs.”

Colonel Legge says:—“In Ceylon the Roller breeds from January until June, chiefly rearing its young about March.”

Mr. J. R. Cripps remarks of this Roller at Furreedpore in Eastern Bengal:—“Common, and a permanent resident. On the 3rd March 1878, I found four fresh pure white eggs of this species. Just at the corner of a ryot’s house stood an old date-tree about 20 feet high, whose top had fallen off and the heart of the tree had rotted away for about a foot in depth; in the hole thus made the birds had laid their eggs without forming any lining. I have frequently noticed this bird at the hottest time of the day descend to the ground and sit with outstretched wings in the sun, and remain so for some time.”

The eggs are a very broad oval, in some instances almost spherical and, like those of the Bee-eaters, they are of the purest china-white and highly glossy. In appearance the eggs are precisely similar

to those of *C. garrula*; but no egg in my collection is either quite as large or quite as spherical as the figure of the egg of *C. garrula* given by Hewitson.

They vary in length from 1.25 to 1.35 inch, and in breadth from 0.97 to 1.12 inch; but I find the average of a large series of measurements to be 1.3 by 1.06 inch.

**Coracias affinis, McClell. *The Burmese Roller.***

*Coracias affinis, McClell.,* *Jerd. B. Ind. i*, p. 217; *Hume, Cat. no. 124.*

Mr. J. Inglis writes that in Cachar this Roller, which, however, is not quite typical, is "extremely common throughout the year. Breeds during March, April, and May in the holes of trees."

Mr. Oates, writing from Pegu, says:—"The eggs, four or five in number, are laid on the bare wood at the bottom of large natural hollows in decayed branches of large trees. The holes selected are generally not less than 20 feet from the ground. The shell is pure white and excessively glossy. My eggs were taken from the 26th March to the 2nd April, and were in all cases either fresh or only slightly incubated. In size they vary from 1.26 to 1.45 in length, and from 1.07 to 1.13 in breadth. The average of 12 eggs is 1.37 by 1.09."

Writing from Tenasserim Major Bingham remarks:—"In a deserted tounyah I found a nest of *Coracias affinis* on the 21st of March containing five eggs, very hard-set. They were laid in a hollow in a dead, dry, and almost rotten tree, on the bare wood. The hollow was about two feet deep, and the entrance-hole an irregular jagged aperture about 3 inches in diameter."

Unless perhaps they seem a shade smaller, the eggs of this species are precisely similar to those of its Indian congener: broad regular ovals, at times a little cylindrical, pure white, spotless and with a fine gloss. Five eggs measure from 1.25 to 1.31 in length, and from 1.05 to 1.1 in breadth.

**Coracias garrula, Linn. *The European Roller.***

*Coracias garrula, Linn.,* *Jerd. B. Ind. i*, p. 218; *Hume, Rough Draft N. & E. no. 125.*

The European Roller, so far as I yet know, breeds (within our limits) only in Cashmere and the Peshawur Valley.

It lays from May to July, making, as a rule, a scanty nest in hollow trees, in sandy banks (specially of rivers and nullahs), and, though more rarely, occasionally in ruins.

Six is, I believe, the largest number of eggs that it lays, but, according to my collectors, four or five is the common number.

The late Captain Cock remarked:—"One of the commonest nests in Cashmere: in holes in river-banks and in hollow trees you are sure to find a pair of these Rollers breeding; they lay in May and June, either five or six eggs. I also found this bird breeding

in cliffs near Nowshera ; though I did not take their eggs I could have done so, had I wanted them. They make no nest to speak of ; a few dead leaves in the hole of the tree where they have laid their eggs being all the nest I have ever found.

“ Breeds in the Peshawur Valley. I saw it flying about cliffs during the months of April and May, and could have taken its eggs had I been so inclined, but I had such large series taken in Cashmere that I did not care for more. I notice the eggs are larger and more glossy than the eggs of *C. indica*.”

Colonel Biddulph informs us that this Roller breeds in Gilgit at 5000 feet.

The eggs that I possess, and have seen, of this species were all from Cashmere, and were long, very blunt-ended ovals, a good deal compressed towards one end. They are larger and very much more elongated than those of *Coracias indica*. They are, as a rule, pure white and glossy, freshly laid ones having often a superb gloss ; but some of them, owing to differences in the texture of the shell, I fancy, appear to be slightly mottled with a greyer white.

They vary in length from 1·48 to 1·56 inch, and in breadth from 1·06 to 1·16 ; a dozen eggs average 1·52 by 1·1 inch.

**Eurystomus orientalis (Linn.). *The Broad-billed Roller.***

*Eurytomus orientalis (Linn.).* *Jerd. B. Ind.* i, p. 219 ; *Hume, Rough Draft N. & E.* no. 126.

Mr. R. Thompson, writing from the Terai below Kumaon, says :—“ In April the Broad-billed Rollers arrive, begin to breed in May, and finally leave the forests in July and August. They breed in holes in the higher branches (never less than 50 feet from the ground) of the loftiest sâl trees. They extend from the Sardah to the Ganges, but particularly abound in the Kotree Doon, where they breed in company with *Eulabes intermedia* in the dense and lofty sâl forests, to which they are strictly confined.”

Mr. F. W. Bourdillon writes from Travancore :—“ On March 17th I was attracted by hearing the chattering of a pair of these Rollers. On going to the spot I found them engaged in ejecting from a hole in a vedu-plâ stump (*Callenia excelsa*), about 40 feet from the ground, a pair of our Hill-Mynahs (*E. religiosa*). One of the Rollers was in the mouth of the hole, and enlarging it by tearing away with its beak the soft rotten wood. The other Roller, seated on a tree close by, was doing most of the chattering, making an occasional swoop at the Mynahs whenever they ventured too close. I watched the birds for some time until the Mynahs went off, and there and then began building in a pinney tree (*Calophyllum elatum*) within the distance of 100 yards. Ten days after I sent for some hillmen, who managed to ascend by tying up sticks with strips of cane, in the way that they erect ladders to obtain the wild honey from the tallest trees in the forest. It was past six o’clock in the evening before a man reached the hole in which the birds had bred. He found not the

slightest vestige of a nest, but a few chips of rotten wood, upon which were laid the three eggs. These I found to be slightly set. While the man was climbing the tree, the birds behaved in a very ridiculous and excited manner. Seated side by side on a bough, they alternately jerked head and tail, keeping up an incessant harsh chatter, and as the crisis approached, and the man drew nearer their property, they dashed repeatedly at his head.

"After the eggs were taken the birds disappeared for about a fortnight, but returned, and I believe laid again in the same position. I did not molest them this time, wishing to get the young. Unfortunately I had to leave home, and on my return I found the birds, old and young, had disappeared."

Mr. T. Fulton Bourdillon, also writing from Travancore, says:—"April 20th, 1872. A pair of these birds built in a hole in a dead tree, and we endeavoured to get their eggs or young on the above date. But the tree was so large and slippery that the coolie could not climb it. Soon after this the birds disappeared, so the young must have been nearly full-grown at this date. They come to us about the beginning of August and leave towards the end of April, after breeding. They are not very common, but, like the Great Hornbill, almost every estate has its pair, which generally are to be found at about 1000–2000 feet above sea level."

Eggs of this species sent me from Mynall by Mr. Bourdillon closely resemble those of the Indian Roller, but are somewhat larger, though not quite so large as those of the European Roller. They are very broad ovals, pure white and faintly glossy.

The specimens I have vary in length from 1·34 to 1·42, and in breadth from 1·14 to 1·16.

## Family MEROPIDÆ.

***Nyctiornis athertoni* (Jard. & Selby).** *The Blue-bearded Bee-eater.*

*Nyctiornis athertoni* (J. & S.), *Jerd. B. Ind.* i, p. 211; *Hume, Rough Draft N. & E.* no. 122.

Mr. R. Thompson informs me that the Blue-bearded Bee-eater breeds in holes in trees in April and May in the Sub-Himalayan forests of the Kumaon Terai. I have never obtained or seen the eggs.

Major Bingham writes from Tenasserim:—"On the 7th March, while going up to the Sinzaway Reserve, I had to encamp at a place called Minzee for an hour, to enable my men to cook their food, and wandering about, gun in hand, I happened to light on a Blue-ruffled Bee-eater, flying out of a hole in a tree, which my Burmese peons called Ma-u. Concluding rather hastily that the bird was certain to have eggs in the hole, I shot it, but on cutting

open the hollow I found only a few chips and a feather or two. The bird had its tail in a very abraded state, and proved on dissection to be a male. Several others were shot on neighbouring trees, and as by the state of the organs of the one shot the birds were evidently breeding, it is probable I might have succeeded in finding more nests and getting their eggs had I been able to stop there a week or so."

He subsequently sent me the following note:—"I cannot positively vouch for the four eggs said to belong to this species which I have procured. The case stands thus:—On the 23rd April a Karen, named Myat-jo, in my employ, brought me four roundish, white, very glossy eggs, and the dead body of a bird of this species, which on dissection proved to be a female, evidently breeding. His story was that he watched the bird go into a hole in the sandy bank of the Meplay stream, and dug it out, catching it alive seated on the four eggs he had brought me. As the place was not more than a mile or so from where I had pitched my camp, I went off at once with him to inspect the spot. Examination of the ruined nest and further questioning of Myat-jo elicited the following:—A tunnel had been dug by the birds into the soft bank to the depth of seven or eight feet, ending in a rounded chamber. The eggs reposed on the bare ground, there being no attempt at a nest. The bird pecked vigorously at Myat-jo's hand, when from time to time he put it in to ascertain how much further he had to dig. The eggs were very hard-set, and I had much difficulty in cleaning them out. They measure 1·13 by 1·05, 1·16 by 1·02, 1·12 by 1·04, and 1·17 by 1·02."

On the whole I also am inclined to accept the eggs. There is no doubt that they are undistinguishable from the eggs of *Halcyon smyrnensis*, but there are nevertheless several reasons for believing that they may really belong to *N. athertoni*. In the first place, I have never known *Halcyon smyrnensis* bore anything like so deep a tunnel. In the second place, the female specimen of *N. athertoni*, said to have been caught on the eggs, proved to be a female that had been recently laying. It had been caught and not shot, and if he did not catch it in the hole, it is difficult to understand how the Karen could have got hold of it. In the third place, the eggs are precisely what the bird might have been expected to lay.

At the same time it must be admitted that we have hitherto had reason to suppose that this bird bred in holes of trees, and Captain Bidgham himself shot a breeding bird issuing from such a hole, and very few species of birds lay both in holes of trees and in holes in sandy banks.

The eggs of this species sent by Major Bingham are nearly round, pure white, a good deal soiled by incubation, and highly glossy. They appear to be undistinguishable from eggs of *Halcyon smyrnensis*.

*Merops viridis*, Linn. *The Green Bee-eater.*

*Merops viridis*, Linn., *Jerd. B. Ind.* i, p. 205; *Hume, Rough Draft N. & E.* no. 117.

The Green Bee-eater breeds pretty well all over India and Burma, though less commonly in damp low-lying localities, such as Orissa and Eastern Bengal. It lays from three to five eggs during the latter half of March, in April, May, and even the first week of June. It breeds *par préférence* in sandy banks or cliffs, but I have found its nest in an old mud wall, and again once close to Ahmedabad in Guzerat in a perfectly level nearly barren plain. Mr. Adam, whose experience had then lain chiefly in the North-Western Provinces and Oudh, formerly remarked:—"This species breeds about the end of March, April, and May; they build in holes in the ground, generally preferring the perpendicular face of a nullah, cutting or embankment, although I have sometimes found them making use of a knoll which kept the opening of the nest above the surface water which might collect on the surrounding ground. I have often watched them digging out the earth with their bills, when they commenced their nests, and scraping it away with their claws. I have always seen them commence a fresh excavation and never known them to make use of an old hole. The opening of the nest is circular, about  $1\frac{3}{4}$  inch diameter and cleanly cut. The length of the passage varies from  $1\frac{1}{2}$  foot to 5 feet, and it increases in width from the entrance to the egg-cavity, which is about  $3\frac{1}{2}$  inches in width. From the entrance, to the nest, the passage usually declines at an angle of about  $30^\circ$ . The excavation is carried on very quickly, and when a piece of stone or kunkur impedes the straight line a detour is made, and the excavation carried on until a sufficient depth is reached. The eggs are laid on the bare ground. Five is the greatest number found in one nest, but three or four are common numbers. In one or two instances the eggs taken from the same nest have presented very different degrees of incubation."

Later, writing from Sambur after some years' residence in Rajpootana, he tells us:—"This bird commences to build here towards the end of March. Although, as a rule, it prefers to build in a bank, I have taken its nest on level ground. The nest is generally about 3 feet deep. I have seen them nearly 6 feet, and the egg-cavity is a long oval with the major axis about 5 or 6 inches; it is without any lining; the angle of the decline from the opening to the nest is about  $30^\circ$ . In some nests which I have dug out, a piece of kunkur or stone has caused the bird to diverge at right angles from the straight line, and then follow the same angle until a sufficient depth has been reached. I have found as many as seven eggs in one nest, although four or five is the normal number, and I have repeatedly found the young birds in the most various stages of plumage, *i. e.*, one all but fledged, and the youngest covered with down. On several occasions I have found frogs occupying the egg-cavity of these nests."

Major C. T. Bingham writes :—“ Breeds both at Allahabad and at Delti in April and May, choosing sometimes extraordinary sites for its nest-holes. In 1873, when the musketry instruction of my regiment was being carried on during the hot weather, I observed several nest-holes of this bird in the front face of the butts of the N.I. range at Allahabad ; and they (the birds) seemed utterly regardless of the bullets that every now and then came and buried themselves with a loud thud in the earth close beside them.”

Colonel Butler says :—“ I found a nest of this Bee-eater at Deesa on the 29th March, containing five eggs. An artificial mud-bank, about a foot high, had been made to mark the limits of the Badminton Court in the Artillery Mess compound, and it was in the bank that the eggs were deposited. The hole which the birds had excavated commenced near the bottom of the bank, and inclined gradually downwards for about four feet. In diameter for about the first  $3\frac{1}{2}$  feet it was not more than two inches, but from that point it grew wider and wider, and ended in a small round chamber about six inches in diameter, and in the centre of this chamber the eggs were laid upon the bare ground and without any vestige of a nest. The cock bird invariably sat upon the Badminton net when people were not playing (and on a tree close by when the court was used), whilst the hen was sitting. I fancy this was one of the first nests of the season.”

Mr. Benjamin Aitken sends me the following remarks :—“ I have no notes of the nidification of this species, but I have been much struck with the way they totally disappear during the hot season, in common with the King-Crow and some Shrikes. In Poona, weeks after the last of them has been seen in cantonments, an occasional pair may be met with in some sheltered spot a few miles out.

“ But with regard to the island of Bombay I have no doubt whatever that the Common Bee-eater migrates as verily as the Common Swallow or the Grey Wagtail. I have been twelve years in Bombay, and never saw so much as a feather of them from April to September. Some day in the first week of June their pleasant call is heard in all directions, and awakens associations like the call of the Cuckoo. Now they are always to be seen in the cantonments of Poona as early as the second half of May.

“ In my notes I have the 6th October, 1865, and the 9th October, 1866, recorded as the days of the first appearance of the Bee-eater in Bombay in those years. The date of their disappearance in 1867 was the 14th March.

“ I never saw any Bee-eater but *M. viridis* in Bombay, but my brother, Mr. E. Aitken, once saw a solitary individual of one of the larger species. He was quite positive about it, so it must have been a stray visitor.”

Mr. Davison remarks :—“ Dr. Jerdon, writing of this species (B. I. i, page 205) says that it does not ascend mountains, to any height at least ; but the bird is very common at Kulhutty on the Nilghiris, about 5500 feet above the sea ; in fact I have taken the

eggs from the roadside just above the dâk bungalow at the above-mentioned place, and I have shot the bird in the Neddivuttum Chinchona Plantations, about 6000 feet above the sea. My experience is that it ascends the hills somewhat higher than *M. quinticolor*, and certainly breeds at a higher elevation than the last-named species. With us on the Nilghiris it breeds at the same time as *M. quinticolor*—that is to say, in March and April—and in the same situations; often the nests of both species may be found side by side. I have noticed that this bird appears to lay its eggs with intervals of several days between each, for I have taken out of the nest a perfectly fresh egg, and one a good deal incubated, and I have found in another nest four young ones, the youngest apparently only a couple or three days old, and the oldest more than half-fledged. I have not found this the case with *M. quinticolor*. I, on one occasion, took six eggs from a nest of this species, but generally the number appears to be four or five. In digging out these nests, instead of finding eggs, the chamber often turns out to be occupied by mole-crickets, spiders or toads, and occasionally by snakes. In this species the tunnel varies from about 18 inches to 4 feet in depth, and the chamber is about 4 inches in diameter. The eggs are laid on the bare ground; there is no attempt at any nest."

Colonel Legge says in his 'Birds of Ceylon':—"This Bee-eater breeds in the sand-hills at Hambantota and other similar localities in Ceylon. I found the young fledged on the south-east coast in June, but did not succeed in finding any nests. The nesting-time is in April and May."

Mr. Oates writing from Pegu tells us that the breeding-season of this Bee-eater is April and May.

And from Tenasserim Major Bingham writes:—"Except in heavy forest-land this little bird is as common in Tenasserim almost as in the North-west Provinces of India. It crosses the Dawna range into the Thoungyeen valley, and is found in suitable spots all along the river. It is a permanent resident and breeds there."

The eggs—little polished alabaster balls—are alone sufficient to show how close are the affinities, despite external differences of form, between the *Meropidæ*, *Alcedinidæ*, and *Coraciidæ*. In size the eggs of the various species of these families differ no doubt, but in every other respect they seem to me identical. The eggs of *M. viridis*, like those of all its affines, are nearly spherical in shape, milky-white in hue and brilliantly glossy. They are small, I think, for the size of the bird, being considerably less than those of *Alcedo ispida*, which they closely resemble. Occasionally, a somewhat oval or pyriform egg is met with, but, as a rule, they are the most truly spherical eggs I know of.

They vary in length from 0.68 to 0.82 inch, and in breadth from 0.64 to 0.73 inch; but the average of a very large series is 0.78 by 0.7 inch.

**Merops philippinus, Linn. The Blue-tailed Bee-eater.**

Merops philippensis, Linn., *Jerd. B. Ind.* i, p. 207.

Merops philippinus, Linn., *Hume, Rough Draft N. & E.* no. 118.

The Blue-tailed Bee-eater breeds from March to June, pretty well all over Continental India, in well cultivated and open country. Like all the rest of the family, it breeds in holes in banks, and lays usually four or five eggs. The holes are rarely less than 4 feet deep, and I have known them to extend to 7 feet. In diameter they vary from 2 to  $2\frac{1}{2}$  inches. At the far extremity, a rounded chamber, as a rule not less than 6 inches in diameter, is hollowed out for the eggs, and at times this chamber has a thin lining of grass and feathers, which I have never yet met with in the nests of the other species.

Mr. E. C. Nunn, writing from Hoshungabad, says:—"I found nests of this species in the banks of the Nerbudda on the 1st April. They consisted of fine grass-roots and feathers loosely placed at the end of a long hole, some 2 or 3 inches in diameter and perhaps 4 feet deep, which the birds had excavated in a high earthen bank. A month later I found the nest of *M. viridis* in a very similar situation."

Colonel C. H. T. Marshall remarks:—"The nests were in large numbers, about 30 or 40 in the sides of mounds, that were old brick-kilns in the station (Lahore). They were holes dug in the earth at heights varying from 4 to 9 feet, and ran about 6 inches further in than a man's arm could reach. There was no lining to the egg-chamber, only a few feathers, nothing else. The eggs were four in number in each nest, nearly round, clear, shining, pinky-white. I found three sets of these nests. The birds lay in June and the young come out in July; the old birds were very pertinacious, hovering round my head when I was digging out the nests. There are large numbers of these birds all the hot weather about Lahore; they go away, apparently, in the cold weather, or at most very few remain."

Mr. F. R. Blewitt from Raipoor writes:—"The eggs were secured in the high sandy banks of the Mahanuddee. The holes burrowed by the birds in the somewhat loose sand of the bank were from 5 to 7 feet deep, and largely rounded out at the far end into a chamber the size of a large saucer. The eggs were laid on the bare sand. This was in May, and all were quite fresh. Five was the maximum number found in any hole. *M. viridis* here, at any rate, breeds a month earlier, since all the nests of this latter species that I examined at the same time contained young ones."

From Kumaon Mr. R. Thompson tells us that "this, too, is a common breeder in certain localities. At Nujeebabad around and about the Pethoragurh Fort numbers breed. I have seen them breed in the hot valleys of the Himalayas far in the interior. But

it is not a forest bird, keeping well out in the cultivated and open parts."

Mr. Adam says:—"Breeds in March and April. The structure of the nest is similar to that of *M. viridis*. I found them building on the bank of a small stream near Baraich, and I have also seen their nests a good distance from the stream. Four is the greatest number of eggs I have found in one nest; on two occasions I found three. On one occasion a bird-catcher brought me an egg of this bird and asked me if I quite believed in its authenticity, because if I did not he would convince me. He then produced a bird, and with a jerk of his thumb forced an egg from the bird exactly like the one he had given me."

Mr. Brooks tells me that "this bird breeds near Digheea on the Ganges, between Allahabad and Mirzapore, and about 10 miles below the junction of the Ganges and Tonse Rivers. Also in the cliffs below the Government Gardens at Mirzapore close to the Dâk Bungalow. I failed to get the eggs, the holes were so deep, 6 and 7 feet I think. These birds breed in company with *Acridotheres ginginianus*."

One year I found a colony of these Bee-eaters established in a small sandy cutting at the Agra Railway Station, where the engines passed twenty times a day within 2 feet of the mouths of the holes.

Major C. T. Bingham says:—"I have found nests of this bird both at Allahabad and at Delhi. At the former place I was too late for the eggs; every nest-hole I dug out containing full-fledged youngsters, some quite able to fly—this was in the end of June. At Delhi I got their eggs in the beginning of May."

Mr. Oates, writing from Pegu, says:—"Breeds in the Irrawaddy and Sittang rivers in large colonies at the end of April. On the 25th of April last I proceeded with six men to dig out as many nests as I could in three hours. I soon found that it was not so easy as it looked. The banks of the Sittang at this place were very steep, and the entrances to the nests were situated about a foot below the top of the bank, and some distance above high water. We found that very few of the galleries were less than 5 feet long, most of them being fully 7. The gallery usually takes a couple of slight turns and is also much inclined to the horizon, so that altogether the entrance may be only one foot below the surface of the ground, the egg-chamber is as much as three or four feet. The gallery itself is  $1\frac{1}{2}$  inches in diameter, very regular in section up to the egg-chamber, which is a roomy place about five inches wide, eight long, and four high. We worked hard, but dug out only 30 nests. Most of the nests contained five eggs, a few only four, and one or two only three. The majority of them were fresh, but a few, even at this early date, were nearly hatched. In no case did the female bird leave the eggs till the egg-chamber and she were exposed to view. In fact we caught several birds. The eggs are laid on the bare ground, and in no case did I find a vestige of grass or feathers."

Major Bingham writes from Tenasserim:—"This bird being partially migratory is often overlooked; but it is common nearly all the year round at Kaukarit on the Houndraw river, where it breeds in April and May in the sandy banks of the Kaukarit choung."

The eggs are white, highly glossed, and very spherical ovals. They average considerably smaller than those of the European Bee-eater, but otherwise they are perfectly identical with these, and I fancy that it would be impossible to separate small specimens of *M. apiaster* from large ones of *M. philippinus*.

In length they vary from 0·82 to 0·97 inch, and in breadth from 0·67 to 0·85 inch; but the average of more than fifty eggs measured was 0·88 by 0·76 inch.

**Merops persicus, Pall. The Blue-cheeked Bee-eater.**

*Merops aegyptius, Forsk.,* *Jerd. B. Ind. i, p. 209;* *Hume, Rough Draft N. & E. no. 120.*

Mr. Adam writes:—"The Blue-cheeked Bee-eater occurs close to Sambhur, and in the Marot hills the natives showed me the holes in which it breeds about the beginning of the rains. I have not yet obtained the eggs."

Major Bingham remarks:—"This large and handsome Bee-eater makes its appearance at Delhi, and in the districts to the south and west, in the end of April; at first in small numbers, but about May in immense flocks. About Delhi itself they bred sparingly, chiefly in high sandy banks near the Jumna; but at Sooltanpoor, near Gurhi Hursaroo, on the Rajpootana State Railway Line in great numbers. The breeding-season lasts from the middle of May to the middle of July, the last eggs I took being on the 9th of the latter month; but most nests contain young by the end of June. Five is the greatest number of eggs I have found in any one nest, and this only on two occasions; the usual number laid I think is three or four.

"The depth of the nest-holes varies from 3 to 7 feet; in diameter they vary from 2 to 3½ inches, and the tunnel almost invariably has a slight inclination upwards, with an occasional divergence to the right or left, and ends in a chamber about 9 inches in length, 4 in breadth, and 4 in height. This is never lined, the eggs being laid on the bare ground. In such nests as I have been unlucky enough to dig out and found tenanted by young ones, I found the remains of grasshoppers, locusts, and other insects, strewing the floor of the chamber. I was glad to find that these latter nests, though ruined, were not deserted by the old birds; but the young fed and taken care of till able to fly."

The eggs are of the usual Bee-eater type, in shape normally very broad ovals, pure white and very glossy. The shape, however, varies a good deal; a good many eggs are almost spherical,

and again two or three I have are much elongated, one cylindrical like a Sandgrouse's egg, another like a huge Swift's.

In size they are intermediate between those of *M. philippinus* and *M. apiaster*. In length the twenty specimens I have vary from 0·87 to 1·00, and from 0·75 to 0·83 in width, but the average of this lot is 0·95 by 0·81.

**Merops apiaster, Linn. *The European Bee-eater.***

*Merops apiaster, Linn.,* *Jerd. B. Ind.* i, p. 210; *Hume, Rough Draft N. & E.* no. 121.

The European Bee-eater, so far as I am aware, breeds nowhere within our limits, save only in Cashmere. There it nests abundantly during May and June, laying from 4 to even 7 eggs; the nests are similar and similarly situated to those of the species already noticed, but they are usually in close proximity to water. The chamber is comparatively large, and at times (to judge from the sample sent me) has a good deal of feather and grass lining.

The late Captain Cock wrote:—"I did not succeed in taking this bird's eggs until a few days before leaving the valley of Cashmere. I found them breeding on the hill-side near Gunderbul in June; they were not in colonies as *M. philippinus*, but two or three nests would occur within a short distance of each other. Advantage was always taken of a steep bank or declivity in the hill-side and the nest was from three to four feet from the surface, a chamber at the end of the gallery without any lining, and containing 5 or 6 white eggs considerably larger than those of *M. philippinus*. I frequently caught the bird on the eggs, they sat so close."

Lieut. H. E. Barnes, writing from Afghanistan, says:—"The European Bee-eater is very common, especially on the hills about the end of April. I have not been able to find a nest, but I feel certain they breed somewhere about the hills. On dissecting several females at the end of May, I found the ovaries well developed, and containing eggs larger than peas. This, coupled with the fact that they are still common (July), convinces me that the birds breed here; but up to the present time not a single nest has been found, nor are any holes seen anywhere in the vicinity where the birds appear most numerous."

The eggs vary very much both in size and shape; some are not bigger than many eggs of *M. philippinus*, others are *very* considerably larger. Some are nearly spherical, others long, broad, obtuse-ended ovals; all are of course pure white, and most of them have a very fine gloss.

In size they vary from 0·95 to 1·13 inch in length, and from 0·87 to 0·94 inch in breadth, but they average 1·08 by 0·9 inch.

**Melittophagus quinticolor** (Vieill.). *The Chestnut-headed Bee-eater.*

*Merops quinticolor*, Vieill., *Jerd. B. Ind.* i, p. 208.

*Merops swinhoei*, Hume; *Hume, Rough Draft N. & E.* no. 119.

Mr. Davison gives me the following note on the nidification of the Chestnut-headed Bee-eater:—"This bird breeds on the slopes of the Nilghiris during March and April. They bore holes in the sandy parts of banks varying in depth from 3 to 6 feet; some are quite straight, others after a depth of a foot or 18 inches turn off at almost a right angle, and others again take a somewhat circular direction. The tunnel always terminates in a circular chamber, about 6 inches in diameter, which is never lined; the eggs, four to six in number, being deposited on the bare and generally somewhat damp floor of the chamber. One favourite breeding locality is the sandy portion of the banks on the Seegore Road, leading from the Nilghiris to Mysore; along 5 or 6 miles of this road the banks are drilled with innumerable holes of this species and *Merops viridis*, sometimes eight or ten together, at others scattered singly along the sandy portions of the bank. The bird sits very close, and invariably allows itself to be dug out without attempting to escape. The diameter of the tunnel of this species is somewhat larger than that of *M. viridis*; in fact, by looking at the holes (when made in a comparatively stiff soil) it is easy to tell which of them pertain to which species.

"I found these birds only commencing to make their holes about the middle of April at the Andamans, although the birds had been seen in pairs since the latter end of March."

Layard has described the breeding of this species in Ceylon, *Ann. Mag. N. H.* 1853, xii, p. 174.

Mr. W. Theobald has the following remarks on its nidification in Mergui:—"Lays in the third week of March. Eggs 5 or 6 in number, pointed oval. Size 0·84 inch by 0·79 inch, colour pure white. Gallery from 1 to 7 feet in length, in soft sandy soil near water: it enters the ground at a small angle and then runs horizontally."

I found this bird breeding at the close of April in a nullah near the Ganges in the Eastern Doon, which in those days was one vast forest. There was a colony of about a dozen pairs, and the only nest I opened was about 4 feet deep, and contained four eggs.

Mr. J. Darling, Junior, says:—"I found four nests of this bird on April 15th, 1873, at Vythery, about 2300 feet, in the soft bank of a road, containing respectively 6 hard-set eggs; 5 hard-set eggs; 3 young birds, and 3 eggs ready to hatch; 5 young birds, and one egg ready to hatch off. The hole leading in to the nest was 2 to 3 inches in diameter, and from 2 to 5 feet deep."

Colonel Legge says in the 'Birds of Ceylon':—"I found the nest of this bird on the banks of the Gindurah in the month of April."

Mr. H. Parker writes :—“ *April to June.* In Ceylon this Bee-eater usually breeds in small colonies, numbering from three to ten pairs, and prefers secluded river-banks, but will nest in road-cuttings, or even under roads, or in almost level ground.”

Writing from Tenasserim, Major Bingham says :—“ On the 2nd April, halting for a day high up on the Oukreen choung, a feeder of the Thoungeen river, I went roaming about in the vicinity of the camp, searching for eggs. I was unlucky, however, and found but one nest, that of this species.

“ A tunnel, sloping upwards, had been dug by the bird into the sandy bank of the choung. It was about  $3\frac{1}{2}$  feet deep and 2 inches in diameter, terminating in a chamber rounded like the bulb of a retort, and rather more in depth and width than the tunnel; it was unlined, and resting on the bare ground were four hard-set, rather glossy, white eggs; these measure 0.9 by 0.75, 0.9 by 0.74, 0.9 by 0.74, and 0.9 by 0.76.”

Mr. W. Davison, also referring to Tenasserim, says :—“ I found them breeding in Tenasserim, and on the 26th March, 1874, I took five eggs out of a hole running about two and a half feet into the bank of a stream, at a place some thirty miles north of Yea.”

These eggs are of the usual Bee-eater type, pure white, very glossy, almost spherical. They are smaller than those of *M. philippinus* and *à fortiori* than those of *M. apiaster*, but they are considerably larger than those of *M. viridis*.

They vary in length from 0.82 to 0.92 inch, and in breadth from 0.72 to 0.81 inch, but the average of a large series is 0.87 by 0.76 inch.

## Order BUCEROTES.

### Family BUCEROTIDÆ.

*Dichoceros bicornis* (Linn.). *The Great Pied Hornbill.*

*Homrai bicornis* (Linn.), *Jerd. B. Ind.* i, p. 242.

*Dichoceros homrai* (Hodgs.), *Hume, Rough Draft N. & E.* no. 140.

*Dichoceros bicornis* (Linn.), *Hume, t. c.* no. 140 bis.

Col. Tickell gives us the following account of the nidification of the Great Pied Hornbill :—

“ Kyik, on the Hounghthrau River, February 16th, 1855. On my way back to Moulmein from Moolevit (a celebrated peak in the Tenasserim Range), when halting at Kyik, I heard by the merest chance from the Karen villagers that a large Hornbill was sitting on its nest in a tree close to the village, and that for several years

past the same pair of birds had resorted to that spot for breeding. I lost no time accordingly in going to the place next morning, and was shown a hole high up in the trunk of a moderately large straight tree, branchless for about 50 feet from the ground, in which the female I was told lay concealed. The hole was covered with a thick layer of mud, all but a small space, through which she could thrust the end of her bill, and so receive food from the male.

“One of the villagers at length ascended with great labour by means of bamboo pegs driven into the trunk, and commenced digging out the clay from the hole. While so employed, the female kept uttering her rattling sonorous cries, and the male remained perched on a neighbouring tree, sometimes flying to and fro and coming close to us. Of him the natives appeared to entertain great dread, saying he was sure to assault them; and it was with some difficulty I prevented them from shooting him before they continued their attack on the nest. When the hole was enlarged sufficiently the man who had ascended thrust in his arm, but was so soundly bitten by the female, whose cries had become perfectly desperate, that he quickly withdrew it, narrowly escaping a tumble from his frail footing. After wrapping his hands in some folds of cloth, he succeeded with some trouble in extracting the bird, a miserable-looking object enough, wasted and dirty. She was handed down and let loose on the ground, where she hopped about, unable to fly, and menacing the bystanders with her bill, and at length ascended a small tree, where she remained, being too stiff to use her wings. At the bottom of the hole, nearly 3 feet from the orifice, was a solitary egg, resting upon mud, fragments of bark, and feathers. It was of a dirty yellowish brownish-white, spindle-shaped or pointed at either end, and of a coarse surface indented with numerous pores; longitudinal and transverse axes  $2\frac{1}{6}$ " and  $1\frac{7}{8}$ " respectively. In the hole were numerous berries, resembling the wild ‘Jamoon,’ in all stages of decomposition. The female, I should remark, was deeply stained with a yellow exudation from the uropygial gland, frequently observed on the feathers of this species, *B. (Hydrocissa) pica*, and *B. albirostris*.”

Mr. W. Theobald makes the following remarks on the breeding of this bird in Tenasserim:—“Lays in the third week of February. Eggs, one only, ovato-pyriform. Size, 2·68 inches by 1·88 inch; colour, pure white; for the measurement of an egg I am indebted to Captain Tickell, who was fortunate enough to observe the female on the nest.”

The Reverend Mr. Mason says, however, that they lay from three to five eggs.

Mr. R. Thompson tells me that “the Great Indian Hornbill begins to breed in April: the young birds are flown by the end of June. They lay in holes of lofty yet hollow trees, sometimes in the valleys, at others on the sides and slopes of well-wooded low hills. I have seen lots of nests of these birds, but never got down their eggs. That the female is a very close sitter I have repeatedly verified. I have watched nest after nest, and have seen the cock

bird with his throat full of berries coming to the hen and feeding her. I do not know about the male plastering the female in with his ordure as is stated by Jerdon. Meer Khan, my chuprassi, who went up to a nest, saw nothing of it beyond what the female herself had ejected, and which covered the sides of the orifice in which the nest was placed. He pulled three young ones, funny-looking wretches, out of the hole. They were covered with fine white down, and their red uncouth-looking bills made them hideous.

“Shy birds, usually, but when breeding they become bolder. When a fledged young one is shot, the old birds remain a considerable time near, uttering their loud and frightful cry at various intervals as if it were to call the missing one. During the coupling season these cries are truly horrible. One knows what the camel is capable of at that season. Here we have the Homrai, which is even worse.

“The old birds are very faithful. If one is shot the other will remain a long time, going from tree to tree uttering its loud yet mournful cries. They are sometimes gregarious to some extent. Last December I counted 15 in one flock. In fact during the whole of last winter I noticed a very large number of flocks composed of individuals ranging from 5 to 15 in number. They are fruit-eaters, but eat flowers and buds readily.”

Mr. F. Bourdillon obtained an egg of this species on the Assamboo Hills towards the end of February, and favours me with the following note in regard to it:—“I received this egg on the 28th February, 1873, after it had probably been taken two days, as I saw the skin of the hen bird, pulled off the nest, quite fresh. The egg was very hard-set, and contained so large a young bird that it was with difficulty extracted piecemeal.

“I was told that there was no nest beyond a little rotten wood which had been scraped into a hollow to receive the egg; also that there was no attempt at plastering up the mouth of the hole, which was in a large tree forty or fifty feet from the ground. The hen, however, was in such bad condition that possibly she could not have flown 10 yards from the nest, until the young feathers, which were just appearing, had matured. The old birds pair in January, and the young ones first show themselves in May, shortly before the rains of the S.W. monsoon commence.”

Turning again to Burma, Mr. Oates, writing from Pegu, says:—“The mode of nidification of this and other Hornbills is now so well known that, being unable to visit the forest where these birds breed in great numbers, I felt no hesitation in sending a Burman to take the eggs for me instead of going myself. He brought me four eggs and the eggs of two females, with the following account:—He found many nests, but could induce the Karen to climb only two trees. Both were wood-oil trees. The nests in both cases were placed in a decayed hole at the spring of the first branches, in one case at about 60 feet from the ground, and in the other somewhat higher. Pieces of the materials with which the holes were closed appear to be composed of dung and earth, with which

are incorporated seeds of the peepul-fig and bits of leaves and sticks.

"The two sitting birds were captured, and the heads are easy to identify with those of females of this species, the bills of the males being different. Each nest contained two eggs, one set quite fresh, the other on the point of hatching. They measure 2·84, 2·6, 2·4, and 2·75 in length by 1·85, 1·9, 1·8, and 1·8 in breadth, respectively. The shell is rough and without gloss. One egg is pure white; two others, one fresh and one incubated, are of a uniform pale yellow; and the fourth egg is white, with numerous small yellowish dots where the outer shell is disintegrated. The eggs were taken on the 22nd March."

Major Bingham records the following from Tenasserim:—"The following is a detailed account of the nests of this Hornbill visited and the eggs taken:—Of the eight nests visited and eggs obtained four contained two eggs each, and four one each. These were laid in natural hollows in various trees, and two in immense *Ficus*-encircled old teak-trees. The height of the nest-holes from the ground varied from 25 to 70 feet, and the trees selected were invariably close to some *Ficus* in fruit.

"To five of the nests I ascended myself, and found the opening much narrowed in every one with a plastering of earth, leaf-mould, and the bird's own droppings: the stench of decaying vegetable matter from one or two of the nests was quite unbearable; and altogether the insides of the nests and the old hens themselves presented a filthy sight, but these latter were all able to fly when released and did not seem a bit cramped. The way though they hissed, and quacked, and fought for their eggs was a caution—my arms were black and blue from their ferocious digs and bites. In a few cases the males came and looked on but took no part in the fight, not even to the uttering of a croak in encouragement to their mates.

"The colour of the egg varies, but depends, I think, more on the nature of the wood of the tree chosen for the nest and the material used in plastering—which, by the way, is well laid on inside as well as round the opening to the hollow—than upon the length of time the eggs have been laid; for two eggs out of the lot I procured had the chicks almost ready to break through, and are yet only of a dull white, but slightly stained; while again two other eggs are of the colour of iron-rust all over, and these, though undoubtedly hard-set, were still easily cleaned, but they were taken out of a hollow in a thingau tree, the wood of which gives off a rusty stain.

"All the eggs have a perceptible gloss, except one. The exceptional non-glossy egg is rough, almost like sand-paper, to the touch. All are very finely pitted over their whole surface, and some have little raised tubercles or bumps chiefly in a zone round the centre. In shape some are long and narrow and much pointed at one end, some short and globular. The largest eggs were those found singly, and of these one measures 2·75 x 1·98; the smallest taken measuring 2·40 x 1·93; but the average of twelve is 2·62 by 1·88. It is remarkable that even the chick in the egg has a well-marked pro-

tuberance above the upper mandible, the rudiment it would seem of the future casque."

A large series of these eggs obtained by Major Bingham show that they vary in shape from very broad ovals, obtuse at both ends, to moderately elongated ones, distinctly pointed at the small end. Quite clearly when first laid they are pure white and have a certain amount of gloss ; as incubation proceeds they lose this gloss, and become more and more stained, until some eggs are a nearly uniform dusky chocolate-brown. The shell is tolerably hard and compact, but it is very commonly thickly set with tiny pimples and rugosities, and in most specimens the entire surface is somewhat conspicuously pitted with pores. Some tolerably fresh eggs, before they have lost their gloss and whilst they have only acquired a creamy tinge, might really be mistaken for pale eggs of Peafowl.

***Anthracoceros albirostris* (Shaw). *The Small Pied Hornbill.***

*Hydrocissa albirostris* (Shaw), *Jerd. B. Ind.* i, p. 247 ; *Hume, Cat.* no. 142.

Mr. Oates, writing from Pegu, says :—" My man on the 20th March procured one egg of this species. The egg was hatched a few moments before it reached me. It measured  $1\cdot8 \times 1\cdot3$ , and was a deep reddish brown. Its natural colour was originally white I should think. On the 22nd March my man again took a nest, killing the female and bringing me the head. The eggs were three in number, pure white and rather glossy. They were well incubated and difficult to blow. The nest was also in a wood-oil tree about 90 feet from the ground in a cavity among the lower branches. These three eggs measure  $1\cdot81$ ,  $1\cdot76$ , and  $1\cdot75$ , by  $1\cdot35$ ,  $1\cdot3$ , and  $1\cdot25$  respectively."

Major C. T. Bingham found the nest of this Hornbill in Tenasserim. He says :—" About a mile and a half from my camp, crowning the top of a low hill and towering high above the rest of the trees, stood a giant pymma (*Lagerstræmia flos reginae*). On the 23rd March I found a nest of the above-mentioned Hornbill in a hole in a huge decayed branch of this tree, fully 50 feet above the ground. To ascend the tree I had to get a ladder prepared, which a couple of Karen's accomplished in about an hour and a half. It was constructed of bamboo, the rungs consisting of tough short pieces driven into the tree and tied at their other ends to a couple of long bamboos, which formed the outer side piece of the ladder. So firm and strong did the affair look, that I went up myself and was able to examine the nest closely. This was, as I have said, in the stump of a decayed branch ; but the entrance to the hole was greatly contracted by a substance that looked like the bird's own dung ; on one side, however, an opening had been left, a mere slit, about 10 inches long by  $2\frac{1}{2}$  inches in breadth, through which evidently the female received food. After carefully inspecting the outside of the nest, I proceeded to break it open with a *dah* or Burmese knife I had taken up ; and soon made a hole

large enough for me to introduce my hand and arm. No sooner had I done so, however, than the female who was, as I feel sure, seated on eggs, seized my wrist, with a grasp like that of a vice, uttering the most horrible cries and fluttering and struggling the while in the most determined manner. However, with some difficulty I dragged her out, and having ascertained with my disengaged hand that there *were* eggs in the hollow, I managed to despatch her by pressing her with my knee against the tree; I was sorry to do this, but then her skin was necessary for the sake of the eggs. Having dropped her I proceeded to take the latter out; these were two in number, of a dirty yellowish-stained white colour, and were resting on a few fragments of bark, a feather or two, and several berries in all stages of decay. They were, I regret to say, both cracked, evidently done in the struggle of taking the bird out, who by the way was as fat as butter and in first-rate feather, not looking at all ragged or dirty as I expected. The hollow was about 2 feet long by 10 inches in height, the entrance being an irregular oval in shape, and measuring 10 inches by  $7\frac{1}{2}$  inches, after the plastered dung was all removed. I forgot to mention that my attention was attracted to the nest by seeing the cock bird feeding its mate; this he did by putting single berries one after another into the tip of her bill which was shoved out of the slit, after receipt of each berry she withdrew her beak apparently to swallow the food. I watched him for a good ten minutes with my binoculars before he saw me and took the alarm and flew off."

Subsequently he writes:—"I was rather too early for the eggs of this species; out of many nests examined only two contained eggs, and these two only one each. What the full complement may be I am ignorant. Myat-jo says four, possibly, but once before I took the eggs of this species and that was later on in March, and then there were only two, but that was up in the Northern jungles near Hpapoon, where possibly they breed later. I have described the nest and eggs before, so have nothing to add except that the present eggs were found in hollows in kanyin trees (*Dipterocarpus alatus*) standing dead and partially burnt in an old cultivation clearing. One nest must have been fully at the height of 100 feet above the ground, the other not half that. The eggs measure 2.04 by 1.37 and 1.84 by 1.39 respectively."

And again he adds the following note:—"A very common bird in the Thoungyén valley. Subsequently to the taking of the two nests, as described above, I had marked down for me and procured three more nests on the 5th March, 1880, of which one contained a single egg, and two, two eggs each."

The eggs are typically much the shape of hen's eggs, and like these are sometimes a little broader, sometimes a little more elongated, and sometimes more pointed at the small end than the normal type. The shell is rather close and compact, the pores very inconspicuous; white and with a slight gloss when quite fresh, but rapidly losing this and becoming discoloured as incubation pro-

ceeds. I have seen none of these eggs as deeply stained as those of *D. bicornis* and *A. tickelli* sometimes are.

Ten eggs measure from 1.81 to 2.02 in length and from 1.32 to 1.4 in breadth, but the average is 1.9 by 1.35.

**Ocyceros birostris (Shaw). The Northern Grey Hornbill.**

*Meniceros bicornis (Scop.)*, *Jerd. B. Ind.* i, p. 248.

*Ocyceros ginginianus (Shaw)*, *Hume, Rough Draft N. & E.* no. 144.

The Northern Grey Hornbill breeds from April to June, in holes and hollows of large soft-wooded trees, such as the aroo (*Ailanthes excelsa*), the semul (*Bombax*, several species), and the peepul (*Ficus religiosa*). The egg-chamber is usually very large, at least one foot in diameter, and the aperture is always more or less closed with the droppings of the bird, whether so placed by purpose aforethought, in view to increasing the internal temperature of the cavity, or accidentally collected about the aperture, in the removal daily by the female of her droppings, I cannot myself say from personal observation. The eggs are from three to five in number; but though I have opened many nests, I have only once obtained the eggs; in all other cases I have found from one to four unfledged young ones. As far as I can judge, the female never leaves the nest-hole from the day she lays her first egg until her young are at least one week old. My friend, the late Mr. C. Horne, gives a good account of the nidification of this species:—

“In April 1868 I received intelligence of two nests, and found that both had been made in the trunk of semul or cotton-trees (*Bombax heptaphyllum*), the bird having dug out and enlarged with his bill holes in this soft wood which had been previously used by Parrots.

“In each case I obtained three eggs; and the hole, at a great height from the ground, appeared to have been plastered up with cowdung, or something resembling it. I could not, however, determine this positively, as in each case I had to go some 6 or 8 miles, and so had no opportunity of observing the process. The bird which I took from one nest had lost many of her loosely put-on feathers and appeared to be in bad condition. As, however, the natives wanted her flesh for medicinal purposes, I allowed them to take her.

“I was, however, more fortunate at the close of the same month (April 1868). On my lawn, surrounded by other trees, stood a noble sissu tree (*Dalbergia sissoo*); and where the first great fork diverged was a hole, for the possession of which, for purposes of incubation, the Rollers and Parrots were always noisily contending. I had often wished the Hornbills to use this; and I was much pleased to see that, after great consultation and inspection, despite much vociferation by the Rollers and screeching by the Parrots, they on April 28, 1868, made up their minds to use it. The hole was nearly a foot in depth and roomy inside. On the 29th of April the female went into the hole and did not again come out.

"There was sufficient room in it for the female to draw in her head altogether when she wished to conceal herself or to bring up the ordure from below.

"The hole being about 10 feet from the ground and opposite my verandah, I could watch everything perfectly through a glass. The tree was also very near to the house.

"From the time the female went in, the male was most assiduous in feeding her, bringing generally the small peepul-fig.

"On April 30th I observed the female working hard at closing the orifice with her own ordure. This she must have brought up from the bottom of the hole; and she plastered it, right and left, with the flat sides of her beak, as with a trowel.

"I never saw the male bring anything but food; and I never found any fruit which had been rejected under the tree, and but very little ordure, which latter had apparently been thrown out by the female when the closing work was finished.

"The male bird would alight near, then fly to the hole (holding on to the bark by his claws) and knock with its beak. On this, the points of that of the female appeared and received the fruit, when the male flew off.

"I herewith beg to submit some of the substance with which the hole was closed up, which is manifestly what I suppose it to be, and when fresh possesses great viscosity. It contains the remains of insects, which probably the female had eaten before she entered the hole, thus confirming Dr. Jerdon's statement as to their various diet.

"The hole was at first perhaps 6 inches in height, and 3 or 4 wide. When closed up, the opening at the widest part was a little larger than would admit the finger. It should, however, be borne in mind that the bill opened upwards, and thus had 3 or 4 inches play. The plastering-operation took two or three days, after which the ordure was thrown out.

"The third Hornbill used to hover about, watch proceedings, and sometimes quarrel with the accepted lord, but he never brought food to the female.

"On May 7th, thinking that I had given time enough for the female to lay her three eggs, which I wanted, I got a ladder, opened out the nest, and with some difficulty got out the bird, who was fat and in good condition, with the desired eggs (three). At first she could scarcely fly, but did so after a little time.

"The natives, who know the habits of these birds well, told me that the female digs herself out directly her newly hatched young need food; and this is most probably correct."

Colonel Butler remarks:—"Mr. J. Davidson sent me an egg he took at Samoda, Khandesh, in April 1880, and two more at Pimpnir, Khandesh, in April 1881."

The eggs that I have are a uniform dull white, slightly soiled and discoloured here and there, and are broad, rather perfect, ovals, devoid of gloss, and recalling the eggs of *Taccocua sirkei* and *Cen-*

*trococyx rufipennis*. Indeed but for being a trifle larger, they might be mistaken for the eggs of this latter species.

Sometimes the eggs of this species are markedly pointed towards the small end. The shell is perhaps finer and smoother than that of any of our other Hornbills; like these they have when quite fresh a slight gloss, but even then they are never, I think, quite white, but always have a slight creamy or ivory tinge.

They vary from 1·62 to 1·82 inch in length, and from 1·16 to 1·29 inch in breadth, but eleven eggs average 1·7 by 1·22 inch.

**Anorrhinus tickelli (Blyth). *Tickell's Hornbill.***

*Anorrhinus tickelli (Blyth)*, *Hume, Cat. no. 144 bis.*

Major Bingham is the only naturalist who has found the nest of this rare Hornbill. He writes from Tenasserim:—"On the way back, as we were crossing a small, almost dry choung, a bird got up, and flying a little way alighted on the branch of a middling-sized pynkado-tree (*Xylia dolabriformis*). Looking at it, I was astonished to see it was *Ocypterus tickelli*, a bird usually so wary and hard to get at. I raised my gun, and was on the point of firing, when I noticed that its beak seemed covered with mud, and instantly afterwards, with a great thump in my heart, I saw a small hole in the very tree it was seated on, the sides of which also appeared to have mud on them. Of course all idea of shooting the bird was abandoned, and in five minutes Myat-jo had a small tree cut down and placed slantingly as a ladder, and ascended to interview the 'missis.' Lord! how she did hiss and cackle, while her mate outside, with loud harsh quacks, flew from tree to tree around.

"After peering and stirring the female about with a stick, for what appeared to my impatience an unconscionable time, Myat-jo announced the disappointing fact of 'no eggs as yet.'"

He adds:—"I have already detailed above the finding of the nest of this species. Visiting it later on, I was able to secure the female, and no less than five eggs, all fresh. This, I fancy, must be the full complement, and is more than any Hornbill of my acquaintance lays. On my second visit the male was nowhere about, and the female only hissed, and bit a little, poor thing. The hollow, as I have said before, was in a pynkado-tree, and not above twelve feet from the ground. This is surprising, especially as the other two nests examined were also at heights of less than 20 feet, and all in small trees. Considering how wary and wild the bird usually is, this is inexplicable. The material used for partially blocking up the entrance seems, in this bird's, as well as in the case of *R. undulatus*, *R. subruficollis*, and *A. albirostris*, similar to that employed by *D. cavatus*.

"The eggs are faintly glossy white, finely pitted like those of the large Hornbill, but none have the raised little tubercles appa-

rent in some eggs of the latter. In shape the five eggs as yet taken are all alike, long ovals. They measure respectively  $1\cdot75 \times 1\cdot33$ ,  $1\cdot75 \times 1\cdot30$ ,  $1\cdot88 \times 1\cdot40$ ,  $1\cdot82 \times 1\cdot35$ , and  $1\cdot83 \times 1\cdot38$ ."

He continues:—"It is strange how tame this Hornbill is during the breeding-season; ordinarily (and I have come across flocks of it on the high hills, between the Zammee choung and the Houndraw river, on the ranges near the Salween, and in various places on the Dawna and its spurs, from the head-waters of the Thoungyeen to its mouth, i. e. from Mooleyit to the Salween) it is the wariest of the wary, keeping well to the tops of the highest trees. I described in a former article a nest and eggs; subsequent to that I managed to procure three nests more on the 5th March; out of these one contained four eggs, one three, and one two respectively.

"I found another nest on the 23rd February, on the Meknay choung. It contained three fresh eggs, two of which, however, were unfortunately broken in getting them down; the remaining one measures  $1\cdot71 \times 1\cdot28$ ."

The eggs are hardly to be separated from those of *A. albirostris*; they vary a good deal in size and in shape, precisely as hens' eggs do. When first laid they appear to be pure white, and have a slight gloss; but as incubation proceeds they entirely lose this, and become creamy brownish, creamy dingy reddish brown, and finally mud colour. The shell is compact, the pores perhaps a shade more perceptible than in *A. albirostris*, from the eggs of which it would often be difficult to separate them.

Fifteen eggs measure from  $1\cdot69$  to  $1\cdot9$  in length, and from  $1\cdot28$  to  $1\cdot4$  in breadth, and average  $1\cdot82$  by  $1\cdot34$ .

### *Aceros nepalensis* (Hodgs.). *The Rufous-necked Hornbill.*

*Aceros nepalensis*, *Hodgs.*, *Jerd. B. Ind.* i, p. 250; *Hume, Cat. no. 146.*

Mr. J. Gammie, writing from Sikhim, says:—"On the 20th of May, Mr. Munro, of Poomong, sent word that he had discovered a breeding-hole of *Aceros nepalensis*, so next morning Dr. King and I went to see what could be done in the way of robbing the nest.

"Mr. Munro met us on the road, and conducted us to the tree, in a hollow of which the female was sitting.

"The tree was a species of *Dysoxylon*, 80 or 90 feet in height, unbranched for 50 feet up, and situated close to a stream at an elevation of about 2000 feet above the sea. A few feet under the lowest branch, and just above a bulge in the stem, there was a vertical slit which proved to be the entrance to the Hornbill's house. Long bamboos were cut and formed into a very primitive sort of ladder, and a Nepalee ascended.

"We stationed ourselves some distance up a steep bank, about

20 yards from the tree, whence we could watch the struggle between the Nepalee and bird. The male had been looking on from a respectable distance at the house-breaking preparations, and uttering hoarse croaks in hopes of intimidating us; but, as soon as he saw the man ascending, he evidently thought discretion the better part of valour, for he took to flight, and was neither seen nor heard any more that day, but, like the bold fellow he was, left his better half to do the best she could under the circumstances.

“The opening appeared ridiculously small for the admission of such a huge bird, and we could see quite distinctly the plaster on each side of the slit. The plastering had evidently been done by the female from inside, and did not meet in any part. At the top of the slit there was a round hole left, and from this hole to the bottom there was a narrow slit of about 2 inches broad down the middle. When the man neared the nest the old lady poked out the tip of her beak and commenced a loud cackling noise, which she kept up for a considerable time. The man stood on the bulge in front of the nest, and held on by a small forked bamboo which he had hooked on to the branch above, and then commenced the struggle between the Nepalee and the mother Hornbill.

“The old lady cackled and protested as well as she could against the unwarranted interference with her domestic affairs. She opened her beak to the full extent of the opening in the tree, and bit manfully at the stick and *kukree* (Nepal knife) which the man pushed in her mouth to try to make her cease from reviling, and move upstairs—the tree, I should say, was hollow for a good way up.

“The bulge was less than a foot in width, so that the man had a very ticklish place to stand on with nothing but a small bamboo to hold on by, and though none of us doubted the pluck of the bold Pahari, yet, what between the frightful noise, the awful-looking cavern of a mouth, and the plucky way in which the bird fought, we were all inclined to back the old lady and give long odds. As it turned out, our bets would have been quite safe; for after a quarter of an hour’s conflict, the Pahari descended in despair.

“A big Lepcha then went up to try his fortune, and, strange to say, he only gave her a single poke when up she went aloft. I suppose she thought, like school boys, one and one fair play, but one down and another at her immediately after, was too much of a good thing, and, no doubt, seeing other eight or ten people down below, had the idea that she would have to fight the lot one after the other, and as they were more than she could reasonably hope to master, it would be better to give in at once, so up she went, and we saw her no more.

“She was still upstairs when we left the foot of the tree some time afterwards; certainly she deserved credit for her pluck, which after all was misplaced, for the solitary egg was addled. The bottom of the hollow on which the bird sat was level with the lower end of the opening. In the hole there were merely a few of her own feathers, which I send you. I also send the egg and

a sample of the plastering \* material, which looks to me uncommonly like the bird's own ordure.

"The entrance, after the plaster was picked away, measured 17 inches in length by 4½ inches in breadth, and the hollow of the tree 17 inches in diameter. The height of the hollow could not be measured, but it must have been considerable. I am told that two young ones were taken out of the same hollow last year, and that it has been robbed every season for many years past. The natives also inform me that the *Aceros* never lays more than two eggs, and occasionally one only, as in the present instance, but that two is the more usual number. The female is said not to leave the nest from the time of her entrance till she comes out with her young ready for flight, a period of about three months.

"The male was seen to feed his mate, through the narrow opening, with *Dysoxylon* fruit the evening before we robbed the nest. At this season of the year *Dysoxylon* fruit seems to be their principal food. The nest tree was laden with fruit, and was probably chosen, on this account, by the lazy husband, in order to reduce the labour of feeding his wife and children to a minimum. The Lepchas and Nepalese eat both the old and the young of the *Aceros*, and pronounce them to be rather good eating."

The egg is a broad oval, compressed somewhat towards one end, so as to be slightly pyriform. The shell is strong and thick, but coarse and entirely glossless, everywhere pitted with minute pores. In colour it is a very dirty white, with a pale dirty yellowish tinge, and everywhere obscurely stippled, when closely examined, with minute purer white specks, owing to the dirt not having got down into the bottoms of the pores.

It measures 2·25 by 1·75.

Another egg taken from the same nest on the 28th of April,

\* "The plaster appears under the microscope to be almost entirely composed of vegetable tissue, cells, fibres, oil-globules, &c., and contains no evidence of the presence of any clay or mineral matter of any kind. The vegetable tissue looks as though it had been semi-digested, very many of the cells being wholly or partially emptied of their contents, and free granules and globules of a bright yellow oily-looking matter abounding.

"The most abundant and characteristic forms of cells present are—1st, small, totally empty thick-walled cells, scattered or still holding together in small patches; 2nd, very large, rounded cells, full of the yellow oily matter so abundant in the free state, and when full of a deep brown colour. Their contents may be rather of a gummy than oily nature, perhaps, as boiling with *liquor potasse* reduces the material to a glutinous mass of deep brown colour. There are naturally also some fragments of feathers, spores of fungi, &c. present in small numbers."

This is our eminent pathologist Dr. D. D. Cunningham's report, and it makes it quite clear, I think, that the plaster is nothing but the bird's own ordure, with which she closes the aperture, leaving a hole large enough to admit of her protruding the whole closed bill, and a slit below sufficient for the play of the terminal two-thirds of the lower mandible when she opens her mouth to be fed. The heap, at the foot of the tree, of rejected droppings daily cast out by the bird, was of the same composition as the plaster, but contained less of the gummy globules, and a larger proportion of feathers, scraps of wood, &c.

1876, was an excessively regular oval. The shell rather finer than in the case of the egg first taken, but as before entirely glossless. The ground-colour of the egg is white, with a very faint brownish pinkish tinge, and it is closely stippled all over with purer white specks. This egg measures only 2·12 by 1·57.

**Rhytidoceros undulatus** (Shaw). *The Malayan Wreathed Hornbill.*

**Rhyticeros obscurus** (Gm.), *Hume, Rough Draft N. & E.* no. 146 ter (*Cat.* no. 145 bis).

The only egg of the Malayan Wreathed Hornbill that I have seen was taken near Sandoway on the 12th March by Mr. Theobald. It is a moderately broad oval, slightly compressed towards the smaller end; a dull, glossless, chalky white egg with a rough surface and tinged brownish towards the larger end. Held up against the light, the shell is a pale buffy yellow. It is very like the egg of *Ocyptilus birostris*, but larger, coarser, and rougher. It measures 1·95 by 1·5 inch.

Mr. Theobald writes:—"The *plicatus* eggs were taken at my order on March 12th in Sandoway. I had for some little time noticed numbers of this species flying about in pairs, and latterly the males, with their crows ludicrously distended with fruits, returning at night alone. I accordingly enquired of some villagers if they could get the eggs, and the result was just two eggs taken in one tree. There is no doubt of the species, as it was the only one there, and one that is well known to the natives."

Major Bingham writes from Tenasserim:—"I was unfortunate with this bird, only one of three nests examined contained eggs; and again when I secured these latter the female managed to elude us by getting up well into the hollow above, which was in a huge dead thingan (*Hopea odorata*). I took the eggs and foolishly left two Karen to cut down the tree, and bring me the female. Bad seran to them, they did so, but spoilt her for a specimen, pulling out the whole tail in dragging her out. However, I have kept the head, the beak of which straight from gape to point measures 6·43 inches, so there is no mistake. The two eggs taken are miniatures of some of *D. cavatus*, but they seem to be broader in proportion to their length than the majority of eggs of the latter species. They measure respectively 2·28 by 1·65 and 2·22 by 1·64."

He adds:—"Subsequent to the taking of the nest above described, I got two others on the 5th March, each containing two eggs, and a fourth on the 17th of the same month, also with two eggs, hard set. It is pretty clear therefore that the bird lays no more than two.

"I also procured two nests respectively on the 3rd and 15th March, both in thingan trees (*Hopea odorata*). The first contained one egg, measuring 2·54 by 1·67; the second two, measuring 2·61 by 1·67 and 2·50 by 1·67."

The eggs of this species hardly differ from those of *D. bicornis*,

except in size. They average much smaller, but a large egg of the present species is quite as large as a small one of *D. bicornis*. They are precisely the same shape, size, and vary in the same way in regard to gloss and colour, though I have seen none so dark as some of those of *A. tickelli*, but the shell is finer, and in no specimen have I noticed the uniformly pimpled appearance so common in the eggs of *D. bicornis*.

Eleven eggs measure from 2.3 to 2.65 in length by 1.62 to 1.87 in breadth.

**Rhytidoceros subruficollis (Blyth). Blyth's Wreathed Hornbill.**

*Rhyticeros subruficollis* (Blyth), *Hume, Rough Draft N. & E.* no. 146 bis (*Cat. no. 146 ter*).

Mr. W. Theobald makes the following remarks on the breeding of this species, Blyth's Wreathed Hornbill, in Tenasserim:—"Lays in the third week of February. Eggs, three in number; ovato-pyri-form. Size 2.20 inches by 1.55 inches. Colour, pure white. Mode of incubation said to be similar to that of the Homrai."

Major Bingham, writing from Tenasserim, remarks:—"I have as yet taken no eggs of this species, though I found several nests, which were precisely like those of *R. undulatus*, but in immense high trees, and far more secure than the nests of any other species from the height and inaccessibility of the localities chosen. The entrance holes were closed up exactly in the same way as in the case of the others, with a plastering of mud, &c."

He subsequently wrote:—"It is not very abundant in the Thoungeen, and I only got two nests, one on the 5th March with two eggs, and the other on the 7th, with only one egg. The three eggs measure respectively 2.22 x 1.63, 2.28 x 1.68, and 2.49 x 1.78.

"In the next year I got one nest on the 1st March at Meeawuddy containing one egg, 2.3 x 1.55. Nest in the hollow of myoukchaw tree (*Homalium tomentosum*) at a height fully of 60 feet from the ground."

Mr. Oates found the nest in Pegu. He says:—"A man on the 22nd March found a nest of this species. It was placed in a wood-oil tree about 70 feet from the ground. It contained only one egg, which was nearly hatched. In colour it is a dull white without any gloss, and the shell is rather rough to the touch. It measures 2.25 by 1.5. These dimensions agree well with Mr. Theobald's."

The eggs of this species appear to me to be absolutely undistinguishable from those of *R. undulatus*, and therefore no separate description is necessary.

## Order PSITTACI.

## Family PSITTACIDÆ.

*Palæornis eupatrius* (Linn.) \*. *The Rose-band Paroquet.*

*Palæornis alexandri* (Linn.), *Jerd. B. Ind.* i, p. 256.

*Palæornis sivalensis*, *Hutton, Hume, Rough Draft N. & E.* no. 147.

The Rose-band Paroquet breeds in the Kangra Valley in April, laying four eggs in large holes in trees, excavated by the birds themselves. Though I have found plenty of nests with young, I have never taken the egg myself, and owe this information to Major Cock.

An egg of this species, taken by him, was a very long oval, very much pointed towards one end, white, a good deal soiled, and with little or no gloss. It measured 1.52 by 0.95 inch.

Of this species Captain Hutton remarks:—"Towards the end of January and beginning of February, it begins to cut a circular hole in some tree wherein to lay its eggs, which are usually two in number and pure white. The tree generally in request for this purpose is the semul or cotton-tree (*Bombax heptaphyllum* and *malabaricum*), although, sometimes, even the hard-wooded sál (*Shorea robusta*) is chosen; the entrance-hole is a neatly-cut circle, either in the trunk or in some thick upright branch. The trees selected by these birds are not situated in the depths of the forests, but are detached on the outskirts, and, what is curious in such a quarrelsome bird, there are often three or four nests in the same tree. The eggs are hatched in about twenty-one days, and in the middle of March the young birds are about half-fledged and are then removed for sale."

Mr. F. Field, writing from Goojrat, in the Punjab, on the 29th March, says:—"I do not know if there is any record of this Paroquet breeding in these parts; so I write to let you know that this morning I found a nest of a pair that had built in a hole in an old bakhain tree.

"There were four well-grown young birds, quite unmistakable Alexandrines, about two weeks old. I saw the old male sitting outside the hole, and the old female came out as the boy was swarming up the tree. I regret I did not find the nest in time to procure the eggs, but I hope to be more fortunate next year."

Mr. G. Reid, writing from Lucknow, tells us:—"I have had the young brought to me in February and March. On one occa-

\* For the purpose of this work it is convenient to unite all the races of this large Paroquet under one name.—ED.

sion I took a nest containing three young on the 3rd April, so I think I might safely say that they breed in February and March."

Mr. J. Davidson, referring to Western Khandesh, remarks:—"This species breeds earlier than either of the Paroquets, the young being able to fly frequently by Christmas time, though I found one nest containing small young ones as late as the middle of March."

Mr. H. James Rainey writes:—"Of the nidification and breeding habits of this exceedingly pretty species of Paroquet, the local name of which is *Chandana*, I made some notes several years ago, when residing in the Eastern Sundurbun, and those notes form the basis of this paper.

"From the last half of the month of March up to the first half of the month of May, these birds are to be seen flocking to the interior of the forests of the Eastern Sundurbun, especially that portion of it situated between the Haringhátá and Bholá rivers on the extreme eastern side of the Jessore district. They at once select suitable trees with convenient hollows in them, some 25 to 30 cubits above the surface of the ground, rather far apart from one another, and away from the banks of rivers and *kháls*. The tree most preferred is, evidently, the *Keurá* (*Sonneratia apetala*, Buchanan), a large tree, the wood of which is light, and the next in demand is, apparently, the *Sundri* (*Heritiera minor*, Roxburgh).

"They build their nests in the hollows, first scooping them down perpendicularly some two to two and a half feet, so that it requires a long arm to be able to remove the nestlings in them; and many go out on this quest annually at the proper season, as a pair of these birds readily fetch about a rupee or two shillings in the neighbouring *háts* or fairs, being in great demand by the natives on account of their beauty, and the facility with which they can be taught to imitate the human voice.

"The eggs are, usually, two or three, and sometimes four in number, slightly smaller in size than pigeon's eggs, and in colour like those of the domesticated fowl, only slightly more whitish. They are deposited in the end of the hollows, the scrapings of the wood being gathered below to form a soft bed for them and the young, when hatched. Both the parent birds perform, alternately, the duty of incubation. The eggs take, I have been told, about four weeks to hatch, but on this point I have no exact knowledge personally.

"During the month of June men go out bird-nesting into the interior of the forests of the Sundurbun, generally three or four of them together, and then the young birds are not quite fledged, and therefore unable to quit their nests. Great numbers of them are hauled out of their nests by the several parties who go out for them, and they find, as before stated, a ready sale for the nestlings.

"The young are able to leave their nests and fly away in the following month, July, and they then go to the cultivated tracts, roosting on the reed-jungle, known in the vernacular as *Nal*

(*Arundo karka*, Linnæus), along the banks of streams; and as vast flocks of them congregate in the same place every night, where they remain for about a month, if undisturbed, before dispersing themselves all over the surrounding country, they are easily caught in large numbers with bird-lime in the following manner. Slender sticks of split bamboo with their upper ends well smeared with bird-lime are placed in those parts of the *Nal* jungle where the birds are likely to settle for the night, and the next morning the flocks fly away, leaving those of their companions that have been caught, with the bird-lime, to captivity for life. Many are secured in this way, which is evidently profitable, for one patch of such jungle as they frequent (another may be miles away) is leased for this purpose for 20 rupees and upwards.

“Jerdon, I find, in ‘The Birds of India,’ says the Alexandrine Paroquet breeds elsewhere during the winter, in the months of December and January; and if this information is correct, as I presume it is, it is noteworthy that they should breed in the Sundurbun in the summer.”

Mr. J. Inglis remarks of this species in Cachar:—“Very common. Breeds throughout the summer in the holes of trees.”

Mr. Oates, writing from Lower Pegu, says:—“I procured three hard-set eggs on the 25th February out of a hole of a large cotton-tree about 25 feet from the ground; colour pure white, much soiled with incubation and with very little gloss. Dimensions of these three eggs:—1·4, 1·35, 1·37, by 1·03, 1·01, and 1·03 respectively.”

Mr. J. Darling, junior, found the nest of this Paroquet in Tenasserim. He says:—“Dec. 10th. Took four eggs of this bird at Weppitau, a small village at the mouth of the Moulmein River, on the opposite bank to Amherst, some two miles from the sea-shore. The nest was in the hole of a tree in light jungle, bordering the side of one of the numerous creeks, and which is always flooded at high water. It was 32 feet from the ground; the entrance was four inches in diameter, and seemed to have been made by the bird in order to get to the hollow in the stump. The eggs were about 2 feet 3 inches below the entrance; there was no lining of any sort, only a few chips on which the eggs were laid.

“One egg was fresh, and the others were slightly incubated.”

The eggs are regular ovals, generally slightly pointed towards the small end, rather broader, though in other respects much the shape of a hen’s egg. The shell is stout, rather coarse in its texture, showing many tiny rugations, especially towards the large end, but has withal a slight amount of gloss. The colour is absolutely pure and spotless white. The eggs of all this subgroup are so precisely alike, that although those of one race may average a little larger than those of another, it would be almost quite impossible to separate small eggs of the one form from large eggs of the other.

The four eggs of the present species procured by Mr. Darling measured from 1·31 to 1·35 in length by 0·99 to 1·05 in breadth.

*Palæornis torquatus* (Bodd.). *The Rose-ringed Paroquet.*

*Palæornis torquatus* (Bodd.), *Jerd. B. Ind.* i, p. 257; *Hume, Rough Draft N. & E.* no. 148.

So far as my experience goes, March is the month in which the majority of our common Rose-ringed Paroquets lay; but I have taken the eggs as early as the 5th of February, and as late as the 3rd of May, though this latter date is, I believe, quite exceptional.

Mr. Adam remarks:—"On the 22nd January I observed a pair of Parrots scooping out a hole in a neem-tree on the Agra and Muttra Road, and on the 30th January I observed a pair with a nest in a mud wall."

Captain Hutton correctly notices that "at the pairing-season the female of this species becomes the most affected creature possible, twisting herself into all sorts of ridiculous postures, in order, apparently, to attract the notice of her sweetheart, and uttering a low twittering note the while in the most approved style of flirtation, while her wings are half-spread and her head kept rolling from side to side in demigyrations; the male, sitting quietly by her side, looking on with wonder as if fairly taken aback,—and wondering to see her make such a guy of herself. I have watched them during these courtships until I have felt humiliated at seeing how closely the follies of mankind resembled those of the brute creation. The only return the male made to these antics was scratching the top of her head with the point of his beak, and joining his bill to hers in a loving kiss."

They lay in holes in trees, chiefly, in Upper India, in mango and siris trees, I think, but I have met with them in fifty kinds. The mouth of the hole, which is circular and very neatly cut and, say, 2 inches on the average in diameter, is sometimes in the trunk, sometimes in some large bough, and not unfrequently in the lower surface of the latter. It generally goes straight in for 2 to 4 inches, and then turns downwards for from 6 inches to 3 feet. The lower or chamber portion of the hole is never less than 4 or 5 inches in diameter, and is often a large natural hollow, three or four times these dimensions, into which the bird has cut its usual neat passage. The hole has no lining, only a few chips of wood on which the eggs rest.

The normal number of the eggs is four, but I have found as many as six, and have taken six nearly fledged young ones out of one hole; in another nest I once found two fresh eggs, one addled egg, and one young bird, at least eight days old. On another occasion I found in a small hole ten eggs and two females, though there was only room for one female to sit on the eggs.

Major C. T. Bingham remarks of this bird:—"Breeds both at Allahabad and at Delhi in February and March, in holes in old walls and in trees; no lining; eggs four in number."

Writing of Rajpootana in general, Lieut. H. E. Barnes says of this species:—"Breeds from the end of February to early in April."

Colonel Butler writes :—"The Rose-ringed Paroquet breeds in the neighbourhood of Deesa in February and March. I took a nest in Deesa on the 14th of February, 1875, containing four fresh eggs, which is somewhat early for this species to lay, as at that time of the year they are still to be seen in immense flocks. This pair I look upon, however, as an exceptional couple, as I had noticed them at work clearing out the hole, in which the eggs were subsequently deposited, for at least three months before the eggs were laid, during which period they never joined any of the numerous large flocks which abound in that neighbourhood during the rains and in the cold weather. I had to push the hen bird off the nest with my hand, and even then she would not leave the hole, although there were no less than three entrances by which she might have escaped. Eventually, after taking the eggs, I left her to mourn the loss of her 'penates,' sulking in one of the passages leading from the nest. Another nest near the same place and in a similar situation, containing four fresh eggs on the 26th February, 1876. Two of the eggs were more in shape like miniature eggs of *Athene brama*, being less round and more compressed at the small end than the ordinary type. Several more nests all through March."

"Belgaum District; nests taken on the following dates:—28th Dec., a nest containing four eggs hard-set; 31st Dec., four fresh eggs; 3rd Feb., three fresh eggs; 23rd Feb., four fresh eggs."

Mr. J. Davidson, writing of this species in Western Khandesh, says :—"It breeds in January and February."

Mr. C. J. W. Taylor tells us that in Manzeerabad, Mysore, this species breeds in February, March, and April.

Mr. H. Parker, writing of Ceylon, says :—"There is a large colony of these birds along the coast adjoining Mannár island. How far they extend is uncertain, but for a length of four miles and a width of a quarter of a mile I found them breeding in great numbers in January, some nest-holes being only three or four feet from the ground."

Mr. J. R. Cripps informs us that in the Dibrugarh district of Assam this species breeds at such a late period as June. He says :—"They lay in June in holes in trees."

Mr. Oates writes :—"Breeds commonly throughout Pegu. I have procured eggs from 28th January to 25th February. On the latter date, however, the eggs were nearly hatched."

The eggs are pure white and glossless, though here and there an egg with some faint glaze may be met with. The normal shape is a moderately broad oval, very perceptibly pointed towards one end, but long and spherical varieties occur. Although devoid of gloss, the texture of the shell is very firm and compact, and there is none of the chalkiness about them observable in the eggs of the Hornbills and Coucals.

In length the eggs vary from 1.05 to 1.37 inch, and in breadth from 0.87 to 1.02 inch; but the average of fifty eggs measured was 1.2 by 0.95.

**Palæornis purpureus (P. L. S. Müll.). The Western Rose-headed Paroquet.**

*Palæornis rosa* (*Bodd.*), *Jerd. B. Ind.* i, p. 259.

*Palæornis purpureus* (*Müll.*), *Hume, Rough Draft N. & E.* no. 149.

The Western Rose-headed Paroquet breeds throughout the plains of Continental India, high up on Mount Aboo, throughout the Salt Range and the lower ranges of the Himalayas up to heights of 4000 or 5000 feet, from Murree to the Ganges. April is the month in which, according to my experience, they commonly lay, but I have found eggs both in March and May.

As a rule, they excavate holes for themselves, with small neat circular apertures, in large trees or huge branches of trees, but I have also seen eggs in natural cavities of decaying trees. Four I take to be the normal number, but I have known five and even six eggs to occur. Mr. R. Thompson writes that this species "breeds from April to June, and selects usually a tree of moderate height and one somewhat decayed. They scoop out a fresh hole every year; at least, those nests I have found have always proved to be new ones. The aperture is perfectly circular and large enough to admit of one bird entering in at a time. The decayed excrescence of a branch is invariably chosen, the birds scooping out the decayed wood, and in the form of the nest following the course of the branch in its growth from the centre of the trunk. The egg-cavity is scooped out larger than the entrance and passage, and usually contains four pure white eggs, much rounded, of about 1 inch in length and  $\frac{8}{10}$  inch in the broadest part. The eggs are laid without any further preparation of a nest or lining of soft material beyond what the decayed wood furnishes as a foundation. The female usually loses her long uropygial feathers, thereby acquiring greater facilities for movements of her body in the nest. She is a close sitter, and will allow herself to be taken rather than desert the nest for a while. The young are easily tamed and soon learn to repeat a short air whistled to them. Many breed together in the same tree, and they evince, in many of their habits, a social and gregarious disposition."

Colonel G. L. Marshall remarks:—" *P. purpureus* is common in the Saharanpore District, and breeds in March in hollow decayed trees, not cutting out a hole for itself, but selecting a natural hollow, generally in a toon or bakain (*Melia sempervirens*) tree; it lays four round white eggs on the decayed matter at the bottom of the hole, which is without artificial lining; some of the eggs are faintly spotted all over with yellowish brown, but these marks almost entirely disappear with washing, and are probably only dirt."

Mr. Benjamin Aitken remarks:—" My observations have convinced me that the great majority of the Rose-headed Paroquets retire to the hills to breed. At Mahabaleshwar and Khandalla their numbers are innumerable in the hot season, and just then

they are conspicuous by their absence in the plains. In Berar, about the middle of June 1870, I observed flocks of these birds arriving after an almost total absence of several months."

Messrs. Davidson and Wenden, writing of the Deccan, say:—"Abundant in the Satara Districts, where it is a permanent resident. It breeds in the plains there in December and on the ghâts in March. During the rains it is very common throughout the Sholapoor Districts."

And Mr. J. Davidson, speaking of Western Khandesh, says:—"It is in February the commonest bird in the low Satpuras, and I have found as many as a dozen nests in a day's walk through the hills."

In the western parts of Ceylon, according to Colonel Legge, this species breeds from February to May.

As a rule, the eggs of this species are proportionally broader ovals than those of the common Rose-ring Paroquet, and they are more distinctly pointed towards the small end. The eggs are much smaller than those of *P. torquatus*; far more so than the relative sizes of the birds would have led one to suspect. The quite fresh egg is of course pure white, but they are almost invariably somewhat discoloured, and at least half my specimens are a dingy cream-colour. They are quite devoid of gloss.

They vary in length from 0·9 to 1·05 inch, and in breadth from 0·75 to 0·86 inch; but the average of some twenty eggs measured was 1·0 by 0·81 inch.

**Palæornis cyanocephalus (Linn.). *The Eastern Rose-headed Paroquet.***

*Palæornis cyanocephalus (Linn.), Hume, Cat. no. 149 bis.*

Writing of the Eastern Rose-headed Paroquet in Pegu, Mr. Oates remarks:—"Nest with four eggs well incubated in a hole of a tree about six feet from the ground. The hole was a foot deep, very roomy, but the entrance, which had been enlarged by the bird, was only large enough to admit its body. The eggs were laid on the bare wood. Although the sitting bird was poked at with a stick, and it took fully half an hour to enlarge the hole in order to take the eggs, yet the bird could not be induced to quit the nest, and eventually had to be dragged out. When disturbed with the stick the female made a noise like the hissing of a snake. These eggs were taken on the 22nd February.

"On the 2nd March two fresh eggs were taken from another hole; and on the 16th March another nest was found also with two eggs well incubated.

"The eggs are of course pure white, rather glossy when fresh, but becoming dull with incubation. The eggs measure from 0·97 to 0·95 in length, and from 0·85 to 0·8 in breadth."

**Palæornis schisticeps**, Hodgs. *The Slaty-headed Paroquet.*

Palæornis schisticeps, *Hodgs., Jerd. B. Ind. i*, p. 261; *Hume, Rough Draft N. & E.* no. 150.

The Slaty-headed Paroquet breeds throughout the Himalayas, south of the first Snowy Range, at heights of from 4000 to 7000 feet. During the winter they keep much lower down, but about March they begin to come upwards to breed, and the majority lay during the latter half of March and April, though I took one nest of fresh eggs on the 5th of May.

They nest at times in natural hollows of trees; in fact, this I think is more usual, but not unfrequently in holes cut by themselves. The tree in which I have most commonly found them is the hill-oak. The eggs are often very deep down and difficult to secure, especially when, as is often the case, the tree is a sound one. The egg-chamber is at times very large, but is never less than 4 or 5 inches in diameter. They lay from four to five eggs, which are commonly placed on chips of wood; the nest has no other lining. The female sits very close and will not leave her eggs, though you may be ten minutes hacking away with an axe to get down to the nest.

Colonel C. H. T. Marshall, writing from Murree, says:—"These nests were invariably very high up in tall trees, most of them in newly-made holes. All that we found this year contained young birds. We got the egg last year. It is 1.15 long by 0.95 inch broad. This species breeds at the latter end of April. Elevation 6000 to 7000 feet."

Captain Hutton remarks:—"Although a true mountaineer, it descends in the winter season to the gardens and groves around Dehra, and is often mixed up with the flocks of *P. purpureus* and *P. torquatus*; but in the early spring they return to the hills, which they never at any season entirely quit, and breed in April and May. The tree most usually selected is a large species of gum-yielding *Bauhinia*, each tree harbouring but one pair of birds."

The eggs are rather broad ovals, pure white when fresh, and glossless. In size they are intermediate between those of *P. purpureus* and *P. torquatus*. They appear to be often much soiled and stained during incubation, as is not uncommon with those of *P. purpureus*, but which is less common with those of *P. torquatus*.

In length these eggs vary from 1.08 to 1.17 inch, and in breadth from 0.89 to 0.94 inch; but the average is about 1.12 by 0.92 inch.

**Palæornis columboides**, Vigors. *The Blue-winged Paroquet.*

Palæornis columboides, *Vig., Jerd. B. Ind. i*, p. 261; *Hume, Cat. no. 151.*

Mr. F. Bourdillon informs me that he has taken several nests of this species in the Assamboo Hills in Travancore. He says:—

“ The first nest we found contained a single fresh egg ; this was on the 6th of January. The second (taken on the 20th of January) contained two fresh eggs, while the third, which we found on the 16th of February, yielded four hard-set ones. Probably four is the full complement. The nest is invariably in a hole in a tree, at a considerable height from the ground, and consists merely of a few rotten leaves and a little decayed wood. I have never observed this species either cutting a hole for itself or carrying any material for a nest. The breeding-season seems to last from the 1st January to the close of March. During April, old and young birds are very noisy ; the latter learning to fly, the former showing them the way to set about it. The eggs are roundish, white and slightly polished, and the average dimensions of seven were 1.07 inch by 0.88.”

One egg, which Mr. Bourdillon kindly sent me, is pure white, has a faint gloss, and though broad and roundish is a good deal compressed and more or less pointed at the small end. Two others are dead white, entirely devoid of gloss and more regularly oval. They vary in length from 1.09 to 1.14 inch, and in breadth from 0.9 to 0.93.

Mr. Benjamin Aitken says :—“ I have seen this bird shot at Khandalla in the hot season, and I suppose it is to be found on other parts of the Western Ghats. Nestlings were brought to me for sale at Poona on the 24th May, 1871 ; they were said to have been taken on the hills.”

Messrs. Davidson and Wenden, writing of the Deccan, say of this species :—“ Moderately common along the very top of the ghâts, and breeds there.”

“ An old bird shot, whilst feeding a young one, in March.”

**Palæornis calthropæ, Layard. *Layard's Paroquet.***

Palæornis calthropæ, *Layard, Hume, Cat.* no. 151 bis.

Speaking of Ceylon, Colonel Legge tells us that “ the breeding-season ” of this species “ commences in January. It nests in holes of large trees ; but I have never been able to procure the eggs, although I have more than once discovered the nest. I have seen one situated in a hora-tree (*Dipterocarpus zeylanicus*) ; the old birds, on flying to it, clung to the bark outside the opening, and then pulled themselves into the hole, using the beak to assist them in entering.”

**Palæornis fasciatus (P. L. S. Müll.). *The Red-breasted Paroquet.***

*Paleornis javanicus* (*Osbeck*), *Jerd. B. Ind.* i, p. 262.

Palæornis fasciatus (*Müll.*), *Hume, Rough Draft N. & E.* no. 152.

I have never myself found the eggs of this, the Red-breasted Paroquet. Mr. R. Thompson writes to me as follows :—“ *Palæornis javanicus*. If this be the bird described under the above name by

Dr. Jerdon, his description is erroneous in so far that the wing-patch is not red but yellow, paling to grass-green on the edges.

"The Madhun Gour Tota breed in the lofty sâl forests of the Sub-Himalayan Range, and are peculiarly restricted to this locality when breeding. Any hole in a tree serves for a nest provided it is near the top of the tree, and the eggs are four in number, pure white, and about the size and shape of those of *P. torquatus*. The breeding-season commences in March, and is carried on till the middle of May, when the young birds leave the nest. Large numbers of them are taken every season when they are yet too young to be able to fly, and carried to the plains, where they are much prized by the natives, learning easily to repeat words and phrases taught them. This Paroquet is generally distributed through the dense and lofty forests, but nowhere is it very common."

Major Bingham sends the following :—" *Maoo Reserve, Zamgee River*, 18th February, 1878. On the march this morning saw a female of *Palæornis fasciatus* slip out of a hole in a decayed branch of a zimbun tree, about 20 feet up. As she sat on a twig close by and seemed loth to leave, I shot her, suspecting there were eggs in the hole I had first seen her quit. And sure enough, on sending up a Karen who cut it open with his *dah* (knife), he brought me down a single fresh egg, which he found at the bottom of a tunnel some foot or so from the entrance-hole, and which he said lay on the bare wood. The egg is pure white, rather coarse-grained and devoid of gloss. It measures 1.25 by 0.98."

I have seen but few specimens of this bird's eggs; these were broad ovals, somewhat smaller than the average of the eggs of *P. torquatus*, and, like them, of a dull, glossless white colour.

Six eggs vary from 1.12 to 1.18 inch in length, and from 0.94 to 1.0 inch in breadth.

**Palæornis nicobaricus, Gould. *The Nicobar Paroquet.***

*Palæornis nicobaricus, Gould, Hume, Cat. no. 152 bis.*

Mr. Davison remarks :—" On the 17th of February I found on the island of Trinkut, Nicobars, a nest of the Nicobar Paroquet in a hole in a branch of a screw-pine (*Pandanus*) about 12 feet from the ground; the nest contained two young birds, one well covered with feathers, the other a tiny little thing, with its eyes closed and without the trace of a feather. There was no lining to the hole, only a little powder from the decayed wood. Again, on the 2nd March, I found a nest also on the island of Trinkut, situated about 30 feet above the ground, in a hole in a branch of a large forest tree; this nest contained two very young birds. On the 17th of April, at Port Mouat, Andamans, I saw a female (*P. tytleri*) feeding two young ones that were sitting on the edge of a hole in an old dry mangrove stump about 12 feet high. As I did not require the birds, I did not climb up to the nest, and so cannot say whether

the hole was lined or not. It is curious that the bills of all the young of these species that I examined were quite red, both upper and lower mandibles ; the adult females always have the bills black. Can it be that the bills turn from red in the young females to black in the adult females ? In *P. fasciatus* the young males have the upper mandible black, turning to red as they become adult. The young of *P. nicobaricus* and *P. tytleri* that I examined *may* have been all males ; but this I think was not likely. I must have seen during my stay at the Andamans and Nicobars at least thirty young birds of these species, of all sexes, either with convicts or in the Nicobarese huts, and yet I never saw a young one that could not fly that had a black upper or lower mandible. The only very young one that I actually dissected was a male."

**Loriculus vernalis (Sparrm.). *The Indian Loriquet.***

*Loriculus vernalis (Sparrm.),* *Jerd. B. Ind.* i, p. 265; *Hume, Rough Draft N. & E.* no. 153.

The Indian Loriquet breeds in the Terai below Darjeeling, the Bhootan Dooars, Assam, Eastern Bengal, Burma, and the Andamans. It lays from three to five eggs, from March to May, in holes and hollows of trees without any nest.

Mr. Davison says :—" On the 19th April, while returning to Ross from Port Mouat, a Burman convict, who was with me, saw a bird of this species fly into a hole in the branch of a forest tree growing by the road-side. He called my attention to this, and I sent him up the tree. On his climbing up, he found the bird (which he caught and brought down with him) sitting on three round white eggs. The hole was about 20 feet from the ground, and contained no lining or attempt at a nest, the eggs being laid on some soft black earthy-looking powder that lay at the bottom of the hole, and which had evidently fallen from the top and sides of the hole. The hole, which was a natural one, not excavated by the bird, was moderately large, but not quite large enough to admit the convict's hand without a little cutting away at its lower edge."

The eggs above referred to are very broad and obtuse-ended ovals, in colour dirty-white, and entirely glossless. They vary from 0·7 to 0·75 inch in length, and from 0·58 to 0·6 inch in breadth.

Mr. T. W. Bourdillon writes from Travancore :—" Last Monday (15th March), while watching the nest of our common Woodpecker, which unfortunately was not discovered until it contained young birds, I saw a Loriquet (*L. vernalis*) fly out of a hole in a stump. The stump was about 15 feet high, and was hollowed out for about the depth of a foot ; this hollow was protected by a thick jungle creeper, under which the bird found room to pass in and out. Investigation showed that the nest was composed of a very few dry leaves at the bottom of the cavity, and that it contained three very hard-set, glossy, white eggs. This nest was at an elevation

of about 2000 feet above sea-level, in a new clearing near the edge of some heavy jungle."

The eggs taken by Mr. Bourdillon, though much discoloured when they reached me, were in most other respects precisely similar to those taken in the Andamans, although a shade larger. They varied from 0·76 to 0·78 in length and from 0·6 to 0·63 in breadth.

Mr. J. Inglis, writing of this species in Cachar, says:—"The Indian Loriquet is rather common; it breeds on the hills about April. It is often found sucking honey from a large red flower in March, when as many as four or five can sometimes be killed at a shot. It flies at a great pace, but is not in the least shy."

Major C. T. Bingham found the nest of this species in Tenasserim. He writes:—"This bird is very common in the Thoungyeen valley.

"On the 24th February, 1880, a nest-hole of this pretty little Loriquet was pointed out to me by a Karen, in the branch of a large silk-cotton tree (*Bombax*) on the bank of the Meplay choung below Gatai village. It was on the side of the brauch at a height of about 40 feet from the ground, so that it was with a good deal of difficulty I managed to get the three eggs it contained down by the help of a rope ladder I had constructed, which, however, did not work well.

"The hole was about 1½ inch in diameter, and about 6 or 7 inches deep, going in obliquely inwards towards the base of the branch. It was unlined, except for a few fragments of chipped wood. The eggs were dull dead white, glossless and rather roundish; they measure respectively 0·68 by 0·59, 0·69 by 0·60, 0·68 by 0·61 inch."

## Order STRIGES.

### Family STRIGIDÆ.

*Strix javanica*, Gmel. *The Indian Barn-Owl.*

*Strix javanica*, De Wurm., *Jerd. B. Ind.* i, p. 117.

*Strix javanica*, Gmel., *Hume, Rough Draft N. & E.* no. 60.

The Indian Barn-Owl, the representative in India of the European Barn-Owl, lays (apparently) in Upper India from the middle of February to the middle of June; Mr. R. M. Adam obtained the eggs on the 10th June near Agra; Mr. Brooks obtained them near Etawah on the 17th of February; and I have obtained them on three occasions in March in Allygurh, near Jeypoor, and near Lucknow. In the Central Provinces they lay from November to January.

As far as my personal experience goes, they breed either in holes of old buildings or in wells, the latter being the favourite locality ; but at Ajmere some native fowlers showed me a pair in a small and easily accessible cave, in which they asserted that these birds had bred for years, and Mr. F. R. Blewitt found their nests in holes of trees.

In some instances the eggs appear to be laid on the bare ground with but a few grass-stems or feathers about them ; in others there is a small stick-nest, much like that of a Pigeon.

According to my own experience they lay three eggs, but according to native trappers *sometimes* as many as six, and *usually* four, while on two occasions Mr. Blewitt found that they had laid seven.

He remarks :—“ It was on the 7th December, 1870, in the forest near Toomgaon, Raepore District, that my men brought me seven half-grown young of this species. They were secured in a large hole about 12 feet from the ground in the trunk of a large mowah (*Bassia latifolia*) tree ; an adult Painted Partridge (*Fran-colinus pictus*) had formed part of their night’s repast. Again, on the 9th of the same month, in the Sumbulpore District in the Singhora beat, in a clump of half a dozen mowah trees, I found in the hollow of a large lateral branch of one (some 9 feet from the ground) six eggs and a young bird just hatched. The eggs were simply deposited on the wood. Seven would therefore appear to be the normal number of the eggs.

“ In neither case was there a *nest* of any kind. The bird is common in these parts (Raepore, Sumbulpore), and breeds always in holes of trees, simply I suppose because it can find no old pukha wells or buildings to breed in. The young birds I reared, and I mention a noteworthy fact. The birds were fond of standing in the water given them in a broad open vessel and bathing themselves. It was amusing, too, to notice their dexterity in grasping with their claws the pieces of meat thrown into the water, which they would devour piece by piece, holding them in one claw like a parrot. When young, the birds were very tame, but as they grew up they became rather wild. They were voracious eaters, and at times it was difficult to procure a sufficiency of food to satisfy their insatiable appetites. It is a singular fact, that when it was given them they would invariably at once disgorge the flesh of owls, kites, or hawks. However disguised the result was the same ; small birds, their favourite food, were swallowed whole.”

Mr. G. Vidal, referring to the South Konkan, says :—“ I found a nest with four young ones in a hole high up in the wall of a house at Khed. I kept two of the young ones, who were very wild and vicious. One, who was shut up in a cage with a young *Bulaca ocellata*, quite as large and nearly as old as itself, killed and ate a large portion of its cage-fellow one night. After this exploit I packed it off with other young Owls to the Victoria Gardens at Bounbay.”

Messrs. Davidson and Wenden remark:—"Commonish at all seasons, and although we know them to breed about Sholapoor, we were not fortunate enough to secure their eggs. D. got a nest with seven young birds in the Satara Districts in February."

"In Jafna," says Colonel Legge, writing from Ceylon, "I understand this Owl breeds in June and July, nesting in the drains in the escarpment of the Fort ditch, without fear at that time of their nests being washed away."

Mr. Oates records the following note from Pegu:—"January 18th. Six young birds, varying much in age, were brought to me. They were found in a hole in the ground.

"11th January. Five eggs in a large hole in a peepul-tree. I took a sixth, perfect egg from the oviduct of the female."

The eggs, like those of all Owls, are unspotted white, but most of the specimens that I have seen had, like many of our larger Owls' eggs, a very faint creamy tinge. In shape the eggs appear to be more oval and less round than those of the European *Strix flammea*, to which they closely approximate. Of all our Indian Owls, too, so far as my experience goes, this species lays the least spherical egg. The texture is compact and fine, but there is less gloss than in most species of this family.

The eggs vary from 1.55 to 1.79 inch in length, and from 1.2 to 1.35 inch in breadth; but the average of thirteen eggs measured was 1.69 by 1.28 inch.

### *Strix candida*, Tickell. *The Grass-Owl.*

*Strix candida*, Tick., *Jerd. B. Ind.* i, p. 118.

*Glaux candida* (Tick.), *Hume, Rough Draft N. & E.* no. 61.

Mr. C. H. Parker, to whom I owe the only egg of the Grass-Owl contained in my museum, has favoured me with the following note:—"When I was in Tirhoot, I found whilst out partridge-shooting near Shapur, on the 26th of October, 1866, a nest of the Grass-Owl in long grass; both the old birds rose from the nest, and one was shot as a specimen. There were five eggs much incubated and two young ones just hatched in the nest. The following day another nest was found in a similar locality containing five eggs; these were fresh, and measured about 1.5 inch long by 1.25 inch broad. The eggs from the first nest appeared broader than those from the last, but I did not measure them."

Colonel Tickell, in his paper on the nidification of certain species in the plains of India, remarks in regard to the present bird:—"Little or no nest, at most a little grass scattered and smoothed down in the midst of heavy grass-jungle; always on the ground. Eggs usually four in number, round, pure white; size 1.75 by 1.37 inch; November or December."

The eggs of this species with which I have been favoured by Mr. Parker are pure white, with very little gloss, and of more

elongated oval than those of *S. flammea*. The two eggs sent by Mr. Parker measured 1.65 by 1.27 inch and 1.66 by 1.28 inch.

Other eggs which I have received from the Khasia Hills and Cachar are quite similar, dull white glossless eggs, rather elongated ovals, varying but little in size or shape; the shell is quite yellow when held up against the light.

They measure from 1.53 to 1.61 in length, and from 1.21 to 1.25 in breadth.

## Family BUBONIDÆ.

### *Ketupa ceylonensis* (Gmel.). *The Brown Fish-Owl.*

*Ketupa ceylonensis* (Gm.), *Jerd. B. Ind.* i, p. 133; *Hume, Rough Draft N. & E.* no. 72.

The Brown Fish-Owl breeds from December to March, but the majority lay, I think, in February. They always nest in the vicinity of water, sometimes choosing a cleft in rocks overhanging a mountain-stream, sometimes a broad shelf in the clay cliffs of some river, sometimes a huge cavity in some old banyan-tree, and at times appropriating an old nest of *Haliaëtus leucoryphus*.

Where they make their own nest, on a ledge or recess of a cliff, it consists of little but a few sticks, mingled with a few feathers, or, when in holes of trees, of a few feathers and dead leaves; but when they annex an old nest of the Fishing-Eagle (and I have several records of this), they seem to line it more carefully with finer twigs, grass, and feathers. I have never found green leaves under the eggs of this species.

Normally they lay two eggs; I have altogether records of nine nests, and in none of them were there more than two eggs or young ones.

Colonel G. Marshall writes:—"This bird is pretty common in the Saharunpore District; it lays two round white eggs, and returns year after year to the same nest. I found one nest in a hollow in the fork of a banyan-tree about 25 feet from the ground, the hollow being so deep that the parent bird, sitting, could not be seen from the ground on any side. I found it accidentally, as I was climbing the tree for another nest. I watched it for three years: in 1866, on the 10th April, I found it with two young ones; in 1867, I visited it on the 17th March, and again found young ones; in 1868, on the 24th February, I found two eggs, the first of which was hatched on 14th March, the other egg I took. The tree in which the nest was was a very large one, in a small grove of jamun-trees (*Eugenium jambolanum*), on the bank of an extensive jheel near Sirsawar."

Mr. Brooks mentions that he "shot a female on the 25th of February, sitting on two addled eggs. What little nest there was consisted of sticks, and was placed on a shelf of the clay cliffs of the Jumna in the Etawah District. The shelf was slightly overhung, and on it, within twenty yards of the Fish-Owl, a *Neophron* had her nest."

Towards the end of July, I found a pair of these Owls with two fully-grown young ones in a tiny cave in the rocky and precipitous banks of the Kosila, near Kakuree Ghat. The cave, the mouth of which was veiled by a large down-trailing andromeda bush, had obviously been their nesting-place, and though well-concealed was easy of access. There were a few sticks covered over with castings and remains of numerous birds and bones of small mammals. I turned the whole family out of their quarters, but did not otherwise molest them, an act of forbearance which I later had cause to regret, as they ceased not, the livelong night through, to give forth the most vociferous protests (from the cliff face, immediately above my tent) against, as I suppose, my neglect to honour them with a place in my museum.

On January 11th, 1867, I visited a large nest in a peepul-tree overhanging the Jumna below Sheregurh, Zillah Etawah, in which, both in 1865 and 1866, to my personal knowledge, a pair of *H. leucoryphus* had reared their young. To my surprise, it was tenanted by a pair of *Ketupa ceylonensis*, which had carefully relined the nest, and had at that time a solitary young one in it, some seven days old, a ball of whitish down. On the nest we found two quails, a pigeon, doves, and a mynah, all with the heads, necks, and breasts eaten away, but with the wings, back, feet, and tail remaining almost intact. Two or three of them were quite dry, and one, which I still have, is quite as good a specimen as most of those that I owe to an eminent naturalist, who appears to preserve his birds by first pulling out half the feathers and then having what remains carefully run over, on very dirty ground, by a heavy cart-wheel!

On the banks of the Sutlej and again near Bhurpore, I found nests which I had been led to as those of *H. leucoryphus* occupied by *K. ceylonensis*.

"On the 10th February," says Mr. Blewitt, writing from Raepore, "a single egg of this Owl was secured; it was found on a little earth in the hollow of a large mohwa-tree where two branches had forked off; the tree was growing on the ridge of a rice-field near some low jungle."

Mr. J. C. Parker writes from the neighbourhood of Calcutta:—"Took two fresh eggs from a nest on the top of a lofty peepul-tree, 7th December. The nest appeared to have belonged to a Vulture, as several of these birds' nests in adjoining trees were of precisely the same construction. This was at Bagoolah, a station on the E. B. Railway, some 60 miles from Calcutta. Found a nearly full-grown young bird in a hole in a mango-tree on the 18th January."

The late Captain Cock wrote to me:—"In February 1875 at Sitapur I found a nest of *K. ceylonensis* in a hollow in the trunk of a huge mango about 9 feet from the ground. A native informed me of the nest, and on climbing the tree the bird flew off its eggs. I just satisfied myself that there were eggs, and I jumped down and knocked the old bird over as she sat on an adjacent tree. The pair of eggs, which were hard-set, were placed on a little dry mud and leaves in this hollow about a foot down."

Mr. G. Vidal tells us that in the South Konkan this Owl is "common both on the coast and inland, wherever there are shady groves and large trees near water. Nine nests found from January to March, all in hollows or depressions of mango-trees, one or two eggs or young birds in each. One abnormally long egg I have measures 2·55 by 1·87."

Messrs. Davidson and Wenden write:—"On 14th February, in the Satara Districts, D. shot a hen from a nest which contained an addled egg. We have not obtained this species in the Sholapur Districts."

Colonel W. V. Legge, writing to me of the nesting of this Owl in Ceylon, says:—"The *Ketupa* breeds with us in June, July, and August, and chooses either a hole in a large tree or a ledge of rock. The eggs are laid on the bare wood without any nest being constructed."

Mr. J. R. Cripps, writing from Furreedpore in Eastern Bengal, says:—"I shot an Owl in a clump of mango-trees on the outskirts of a village. The report of the gun flushed a second bird from a large hollow in the stump of a mango-tree, and about 9 feet off the ground; found two eggs, one just hatching off, which I left; no lining of any kind to the hole. The villagers told me that every year a pair of this Fish-Owl lays in that hole."

Finally Mr. Oates records this note from Pegu:—"Nest in a fork of a large tree 10 feet from the ground. Two young birds about one month old. March 31st."

The eggs are very perfect, broad ovals, white, with, in most specimens, the faintest possible creamy tinge. The shell close-grained and compact, freely pitted all over its surface, but, nevertheless, more or less glossy. They seem to me undistinguishable from many of those of *Bubo coromandus*.

In size the eggs vary from 2·29 to 2·56 inches in length and from 1·81 to 1·94 inch in breadth; but the average of twelve eggs measured was 2·38 by 1·88 inches.

### *Ketupa javanensis*, Less. *The Malayan Fish-Owl.*

*Ketupa javanensis*, Less.; *Hume, Cat.* no. 73 bis.

Major C. T. Bingham found the nest of this Owl in Tenassserim. He says:—"On the 27th February, while wandering about in the neighbourhood of Meeawuddy on the Thoungeen River, I started a couple of these Owls, of which I shot one, from among the

branches of a large nyongbin (*Ficus*, sp.?), hanging over the bank of a small choung or stream. Thinking there might be eggs, I sent a peon up, and soon heard from him that at the place where a large branch forked off, a natural depression existed, where a single large round white egg lay on a few withered twigs and feathers. The egg was quite fresh, dull chalky white in colour, and measures 2·21 inches by 1·87."

The egg is very similar to that of *K. ceylonensis*, but is somewhat smaller. The ground white, becoming during incubation soiled and smeared with brownish stains. The shell is fairly compact and hard, showing, however, here and there a great number of pit-like pores. It has little or no gloss.

In shape the egg is, of course, an excessively broad or round oval, much the same at both ends.

**Bubo bengalensis (Frankl.). *The Rock Horned Owl.***

*Urrua bengalensis (Frankl.).* *Jerd. B. Ind.* i, p. 128.

*Ascalaphia bengalensis (Frankl.).* *Hume, Rough Draft N. & E.* no. 69.

The Rock Horned Owl breeds, as a rule, in February, March, and April, but eggs are occasionally met with both in December and January, and in the lower valleys of Gurhwal, according to Mr. R. Thompson, may be met with as late as the end of May.

The birds make no nest, but merely scoop a small hollow in the earth, in which to deposit the eggs. Occasionally they will lay on the level ground under some overhanging bush or tuft of grass, but almost without exception they choose some little cave or recess in, or projecting ledge or shelf of, some rocky or earthy cliff in the neighbourhood of water. The precipitous banks of canals and rivers are perhaps their favourite breeding-places, and, as my friend Colonel G. F. L. Marshall first pointed out to me, they (in Northern India) almost invariably select a cliff-face looking westward.

The normal number of the eggs is perhaps four; but I have often found three and, more than once, only two eggs much incubated.

This species is very common in the Saharunpore District, especially towards the north, and from thence Colonel G. Marshall sent me the following account of its nidification:—

"The Rock Horned Owl breeds from December to April, the middle of March being the best time for searching for its eggs. On one occasion only I found the eggs on the level ground, on a plain, at the foot of a tuft of grass; on every other occasion I have found them on a ledge, in the perpendicular bank of a ravine, generally by the canal, and, without exception, on the left bank, facing the west. It lays four very round, pure white eggs, slightly hollowing the ground to receive them, but making no attempt at a nest or even a lining to the hole. I have always found the nest close to water.

“ I found two fresh eggs	on 16th December.
“ two fresh eggs	21st March.
“ four half-fledged young	26th ”
“ two fresh eggs	28th ”
“ two young birds	3rd April.
“ four set eggs	3rd ”
“ four fresh eggs	16th ”

“ The birds keep close to water as a rule, and the male bird seldom wanders far when the female is sitting; they seldom perch on trees, and, during the breeding-season, the male bird may be seen sitting on the top of the bank, somewhere near the nest, at all hours of the day. They are rather shy birds, and leave the nest at once if approached.”

Captain Hutton remarks that this species is “ common along the foot of the hills in the Doon; I have had the young ones in March from a hole in a steep bank of a ravine at Rajpur; in April, also, a man brought word that he had found a nest, with nothing in it, but it was only just completed; waited for a fortnight, and sent a man to bring the eggs, but it again proved blank. The bird ascends sometimes in the summer to 5500 feet.”

Captain Cock wrote long ago:—“ Coming home on the 17th March, at Dhurumsala, I took a nest of *Bubo bengalensis* with eggs. I shot the old bird. The nest was in a little cave in the face of a steep precipice, full of little bones of rats and mice, one or two feathers, and only a slight depression in the sandy floor. Eggs hard-set.”

Dr. Jerdon says:—“ I have found its nest on a well-shaded ledge on the south side of a ravine, where the light of the sun could not penetrate at that season, viz., March. It lays two or three white eggs.”

Major Bingham remarks:—“ I once found a nest of this common Owl on the 5th January in a small cave in the high bank of a nullah the other side of the Jumna from Delhi. Nest there was none; the eggs, two in number, rested on the bare ground. The cave was about a foot deep, and overhung by a caper bush.”

Mr. Benjamin Aitken writes:—“ A pair of these birds had a nest on the bank of the river at Akola, Berar, in February, 1870 and 1871.”

Messrs. Davidson and Wenden, writing of the Deccan, say:—“ Common along all the brooks and rivers. Found numerous nests (*facing all points of the compass*) in November and December. Six was the greatest number of young or eggs observed in one nest. All the eggs, with the exception of one, which lay on a bare ledge of rock, were found in naturally formed holes in clay banks.”

Mr. G. Vidal, referring to the South Konkan, writes:—“ Rather common on the rocky hill-sides overhanging the tidal creeks. Two nests were found in January, both in fissures between steep boulders on the sides of hills. In one nest there were five, and in one only two young birds. One of the nests faced due east, a

fact worth mentioning, as Colonel G. F. L. Marshall has pointed out that (in Northern India) these birds almost invariably select a cliff facing westward."

Writing of Rajpootana in general, Lieut. H. E. Barnes says:—  
"The Rock Horned Owl breeds during March and April."

Captain Horace Terry communicates the following note:—  
"About four miles from Bangalore, near the rifle-range at Hebbal are some very peculiar nullahs. They are very deep, and instead of forming a watercourse in any particular direction, wind about to such an extent as to form a perfect maze. This is a grand place for Owls, and any afternoon, wandering about there, one would be certain of seeing one or two *B. bengalensis*, and towards dusk of hearing what appeared to be an unlimited number. Although I spent a good deal of time looking for them, I found but one nest there, if nest it can be called, in December 1883. There were two eggs much incubated, and much discoloured by the red sand."

The eggs of this species appear, comparatively speaking, very uniform in size and shape. Very perfect broad ovals, white, with a faint creamy tinge; they are, but for a slight superior glossiness, scarcely distinguishable from those of *Syrnium ocellatum*. In texture they are finer than the eggs of *B. coromandus*, and for the size of the bird seem to me decidedly small.

The eggs vary from 1.98 to 2.20 inches in length, and from 1.65 to 1.8 inch in breadth; but the average of ten eggs measured is 2.10 by 1.73 inch.

***Bubo coromandus* (Lath.). *The Dusky Horned Owl.***

*Urrua coromanda* (Lath.), *Jerd. B. Ind.* i, p. 130; *Hume, Rough Draft N. & E.* no. 70.

The vast majority of these Dusky Horned Owls lay (in Upper India at any rate) in December and January, but I have found the eggs on several occasions in February and once early in March.

As a rule, they construct stick-nests (which from the same pair resorting to them for many successive seasons, and adding to them yearly, are at times enormous) in the fork of some large tree. At times they appropriate some old nest of the Tawny Eagle placed in some thick and thorny, but comparatively low, acacia tree. In most cases, the nest contains some lining of more or less green leaves, and a few feathers or a little grass. Occasionally I have found the eggs laid in the hollow of some huge stump, or in the depression at the fork of three or more large branches, with no stick-nest, and only a few dry leaves as a bed; but out of more than thirty nests that I found one December in trees along the banks of the canal near Hansee and Hissar, all but one were regular stick structures. One nest contained no lining but a little dry earth. The great majority of the nests that I have examined contained two eggs, often much incubated, but I once found three, and have

heard of four being met with. In two instances, I see by my notes that single fully incubated eggs were found.

In this species I have invariably found the female sitting, but the male is always near at hand, and very commonly sitting on some branch immediately above the nest. I once shot a female sitting on a partly incubated egg, and on skinning her found a second egg in the oviduct ready for expulsion. I have repeatedly taken one perfectly fresh and one partially incubated egg out of the same nest, and it seems clear that these birds, like the Harriers and many Owls, begin to sit directly the first egg is laid.

Colonel Butler writes :—" *Sukkur*, 24th January, 1879, a nest in the fork of a kundee-tree about 30 feet from the ground. It consisted of ordinary sticks like an old Kite's nest, and the tree upon which it was built was bare and leafless, recalling to mind the figure of the nest of *Ketupa ceylonensis* in Colonel Marshall's book on 'Bird's-nesting in India.' The tree upon which the nest was built was growing in the middle of a thick group of bare thorny trees, with a clump of date-palms close by, in which the cock bird concealed himself. The hen bird sat close, allowing the boy who ascended the tree to approach within a yard of her before she left the nest. From below she was not visible when sitting, but at a distance of 40 or 50 yards from the tree her cat-like head could be seen occasionally raised above the top of the nest. The nest contained a solitary fresh egg, and strange to say, after it was taken, the hen bird sat closely for at least a fortnight without laying again, allowing me to visit the nest frequently during that period without forsaking it."

Mr. Scrope Doig writes from Sind :—" Found nests on 15th and 21st February, that contained young ones, two in each."

Mr. J. Davidson, writing of this species in Khandesh, says :—" Probably a permanent resident, but scarce. I only came across it twice, in both cases in December, breeding."

Lieut. H. E. Barnes, writing of Rajpootana in general, says :—" The Dusky Horned Owl breeds during December and January."

Mr. C. J. W. Taylor, writing from Manzeerabad in Mysore, remarks :—" I shot a female off her nest, a mass of sticks, laid between two immense arms of a mango-tree ; the nest contained one hard-set egg. This was in April 1882."

Mr. J. R. Cripps writes :—" On the deserted ryot's holding, where I found a nest of *Aquila hastata*, and on a tamarind-tree within 50 yards of the latter nest, was one of this Owl containing a young bird, whose quill-feathers were a couple of inches long. This tamarind-tree stood about 100 yards off the public road, and the nest was placed about 40 feet off the ground in the centre of the tree. It was a huge structure of sticks and twigs, more in fact than a man could carry ; no lining, but the nest contained the remains of a young Urrua and the heads of 15 young *Corvus levillantii*, which had evidently supplied many a meal to the young monster. There were also the shells of ever so many Crows' eggs in the nest ; the smell from all this was very offensive. The female

flew off the nest when my man went up, but I bagged the male, which was sitting on one of the side branches. In this clump of trees the natives said these birds built every year. I took the young one home, and he lived for over a month, feeding on raw flesh. I had to come away from the factory for a few days, and the foolish servant left the room-door open, when an Imperial Eagle I had got in and tore the unfortunate Owl to pieces."

The late Mr. A. Anderson furnished me with the following note:—  
"I have acquired a pair of really well-marked eggs of the Dusky Horned Owl, which I took on the 28th of November last from an old nest of *Mycteria australis*, shooting one of the parent birds off the nest.

"The markings consist of indistinct lilac blotches, showing through the shell, as it were, on of course a pure white ground; and they are both *profusely* though minutely spotted, especially at the extreme end, with brown and lilac spots (or rather specks) of various shades."

These eggs measured 2·33 by 1·89 and 2·89 by 1·9.

The eggs of this bird vary surprisingly in size and shape. Typically they are a broad oval, comparatively very large for the size of the bird, but long, oval, pyriform, and nearly spherical varieties occur. I have taken a very great number of these eggs myself, and have extreme sizes of which the cubic contents of the one are fully double those of the other. In colour they are a decidedly creamy white, in texture often somewhat coarse, but withal more or less glossy. I have many specimens greatly exceeding in size the egg of *Bubo maximus* figured by Hewitson, while I have one specimen scarcely exceeding the egg of *S. stridula* which he figures.

The eggs vary from 2·2 to 2·55 inches in length, and from 1·75 to 2 inches in breadth; but the average of fifty-six eggs measured was 2·33 by 1·89 inch.

**Scops pennatus, Hodgs. The Indian Scops-Owl.**

*Epialtes pennatus (Hodgs.),* *Jerd. B. Ind.* i, p. 136.

*Scops pennata, Hodgs.,* *Hume, Rough Draft N. & E.* no. 74.

Of the present species, the Indian Scops-Owl (*S. pennatus*) I have never yet taken the eggs, but Mr. R. Thompson informs me that "they breed from March till August, in holes of trees, usually at no great height from the ground." He adds, "This is a common bird in our forests (Gurhwal), but I never yet took the trouble to take their eggs. Several pairs used to breed in the Botanical Gardens at Saharunpore. A pair has been breeding for three seasons in a small tree in front of the forest Bungalow at Kotedwara. Four years ago, a young one, in the rufous phase, was brought to me in the month of July."

This species, at any rate the grey form of it, occurs throughout the well-wooded portions of India and Burma (except perhaps in the Punjab, west of the Beas, from whence I have seen no specimens whether from hills or plains), so that there should be no difficulty in obtaining full particulars as to its nidification.

**Scops spilocephalus** (Blyth). *The Bare-foot Scops-Owl.*

*Scops spilocephala* (Blyth), *Hume, Rough Draft N. & E.* no. 74 bis :  
*Cat. 74 ter.*

So far as I know this species only breeds, indeed only occurs, in the Himalayas, in well-wooded valleys, at elevations of from 3000 to 6000 feet.

It lays from about the middle of March to the middle of June, in holes of trees ; no nest appears to be made ; the eggs, from three to five in number, are laid upon the bare wood.

A nest of this species found near Kotegurh on the 30th April, in a hole in an ash-tree some 30 feet from the ground, contained five eggs ; so very large for the size of the bird that, but for both parents being captured in the hole with them, one might have doubted their pertaining to this species.

Captain Hutton gives the following account of the nidification of this species (he calls it *pennatus*, it is true ; but he has sent me beautiful specimens of the birds, which leave no doubt that the species referred to is the present one) :—

“ This Owl occurs on the Himalayas, in the neighbourhood of Mussoorie, at an elevation of 5000 feet, and nidificates in hollow trees, laying three pure white eggs, of a rounded form, on the rotten wood, without any preparation of a nest. Dimensions of egg, 1.19 by 1 inch. The nest was found on the 19th of March.”

On a subsequent occasion he took a nest in April, and sent me the eggs, which were considerably larger than those he first described.

From Murree, Colonel C. H. T. Marshall writes :—“ We found a nest containing two eggs, in a dead tree, about 15 feet from the ground, on the 1st of June, low down the hill-side ; the elevation at which the nest was found was about 6000 feet. The eggs are white, and 1.3 in length by 1.1 in breadth.”

He subsequently sent me the old birds, which proved to have been correctly discriminated.

The eggs are very round and perfect ovals, pure white, and not very glossy, some of them fully as large as those of *S. bakkamuna* (*griseus*, Jerd.), which is a far larger bird.

The eggs vary in length from 1.19 to 1.33 inch, and in breadth from 1.0 to 1.13 inch ; but the average of a dozen eggs is 1.26 by 1.09 inch.

**Scops lettia**, Hodg. *The Nepal Scops-Owl.*

*Ephialtes lempigi* (Horsf.), *apud* Jerd. *B. Ind.* i, p. 138.  
*Scops lettia*, *Hodgs.*, *Hume, Rough Draft N. & E.* no. 75.

The only eggs that I have seen, unmistakably pertaining to the Nepal Scops-Owl, were taken the 22nd May, 1869, out of a narrow cleft (completely hidden by a small drooping shrub) in an over-hanging precipice, in the valley of the Surjoo, between Petoragurh

and Almora, in Kumaon. They were described as laid on a few small sticks, or twigs, amongst which a few feathers were interspersed. In all other instances in which I have myself found, or have known of the finding of, the eggs of any species of Scops-Owl in India, they have been in hollows of trees; but both parent birds were sent me in this instance with the eggs, and I had no reason for doubting my collector's good faith, who, although a native, is a tolerable ornithologist, and, so far as my experience goes, very careful and reliable. The eggs, three in number, were very spherical in shape, pure white and very glossy, and varied from 1.33 to 1.38 inch in length, and from 1.18 to 1.2 inch in breadth.

Two other eggs, *purporting* to belong to this species, were sent me from near Darjeeling. I cannot vouch for their authenticity. They measured 1.28 and 1.3 inch respectively in length, and 1.14 and 1.15 inch in breadth.

This species extends to Burma. Mr. Oates writes from Pegu:—

“ March 24th. This bird selects a small hole in medium-sized trees. Two nests, each with three young birds, varying in age from a fortnight to three weeks.”

**Scops plumipes**, Hume. *The Plume-foot Scops-Owl.*

**Scops plumipes**, Hume; *Hume, Rough Draft N. & E.* no. 75 bis.

Four eggs of this species, the Plume-foot Scops-Owl, together with the female bird, were sent me from Kotegurh, where the latter had been captured on the eggs, in a hole in a tree. The eggs were taken on the 13th of May and were partly incubated. They are intermediate in size between those of *Carine brama* and *Glaucidium cuculoides*, but they are more spherical than either. They are of course pure white and slightly glossy. They do not appear to be quite as large as some of those of *S. bakkamuna* that I possess.

In size they vary from 1.26 to 1.28 inch in length, and from 1.1 to 1.5 inch in breadth.

**Scops bakkamuna** (Forst.). *Forster's Scops-Owl.*

**Scops bakkamuna** (Forst.), *Hume, Rough Draft N. & E.* no. 75 ter.

Forster's Scops-Owl (*S. griseus*, Jerd.), by far the commonest species of this genus in India, is widely distributed through the Punjab, the North-Western Provinces, Rajpootana, the Central Provinces, Oudh, and Ceylon. Throughout these provinces it breeds; as a rule, being confined to the plains and the lower ranges that intersect these, but occurring occasionally in the Himalayas also to an elevation of say 6000 feet. I have received specimens (in many cases with the eggs also) from Dera Ghazee Khan, Hansee, the Doon, Almora, Bareilly, Etawah, Jhansee, Saugor, Mount Aboo, Raepore, Sumbulpore, and intermediate localities, and lately from Ceylon. This species lays from the middle of January to the beginning of April, invariably, as I believe, in holes

in trees, which it commonly lines, more or less, with leaves and grass. Four is the normal number of the eggs, but five are occasionally met with, and three fully incubated eggs or newly hatched young ones are often found.

Although I have taken the eggs of this species several times, I have, I regret to say, only one note on the subject:—"Puhpoondh (Zillah Etawah), March 10th, 1867. I caught a female *Scops griseus* to-day on her nest, at least on one egg in a hole in a mango-tree, which also contained about a dozen dry leaves and a few feathers, whether blown in by accident or placed there by the bird I cannot say. The little animal bit and scratched so vigorously that I had to use a cloth to get her out; she fought so valiantly for her *penates* that I was sorry to sacrifice her, but it was important to preserve her skin to prevent future doubts as to the species to which the egg really belongs. She contained another fully developed egg, which my stuffer stupidly broke in skinning her. The egg was quite fresh; it looked a large egg as compared with those of *Carine brama* (though it is shorter than some of these latter), owing to its great width. It is pure white, without any tinge, either of blue or cream-colour, fine in texture, and almost as glossy as a Dove's egg. It measures 1·25 by 1·15 inch."

Mr. W. Blewitt found two nests, both in sheeshum-trees on the canal-bank near Hansi. Both nests were in holes, the one contained one, the other two fresh eggs, a bed of leaves and straw being placed under the eggs. The nests were found on the 25th March and 2nd April.

The next year he procured at least a dozen more nests between the 18th January and the 2nd April, in the trees that fringe the Hansi and Hissar subdivisions of the canal.

Colonel Butler writes:—"At Hyderabad, Sind, on the 10th April, 1878, I found a nest of this Scops-Owl in a hole of a large tree about 40 feet from the ground. A young bird, about 10 or 12 days old, was lying at the foot of the tree alive, but with its head much bruised by the fall. How it got there I don't know, but I fancy it must have been taken out of the nest by Crows and dropped there, as there were several Crows in the tree when I found the nest, and one of the parent birds (the female), which flew out of the tree when I threw up a stone, seemed much excited. I sent a boy up the tree to examine the nest, but it was empty, so I shot the two old birds. I found the cock bird with some difficulty, as he was sitting asleep on another tree about 50 yards off, looking for all the world like an old decayed stump, and it was not until after a long search that I discovered him. From the size of the nestling the eggs had evidently been laid early in March."

Colonel Legge, writing from Ceylon, says:—"In the southern parts of the island this Scops-Owl breeds in February and March. It nestles in hollow trees or in holes made by Woodpeckers in palms. A nest found at Oodogamma during my stay at Galle was placed in the hollow between the frond and the trunk of a Kitool

palm (*Caryota urens*). A few leaves or grass-stalks usually line the hole in which the eggs are deposited."

The eggs are pure white, glossy, and very spherical *as a rule*, though they vary a good deal in shape, some being slightly elongated and some slightly pyriform. In size they vary greatly; in length from 1.13 to 1.38 inch, and in breadth from 0.95 to 1.18: but the average of forty-eight eggs is 1.25 by 1.05 inch, or precisely the same as the average of *Carine brama*.

**Scops malabaricus, Jerd. Jerdon's Scops-Owl.**

Scops malabaricus, *Jerd.*, *Hume, Cat. no. 75* quat.

Mr. G. Vidal remarks:—"The Malabar Scops is common in the north of the Ratnagiri district, but less so, as far as my present experience goes, in the south. It is entirely nocturnal, but its low, subdued call after nightfall easily betrays its haunts. I have found it in holes of trees, in houses, and in nooks in dry wells.

" All the nests, six in number, I have found were got in January and February, in holes of mango- and jack-trees. Three appears to be the maximum number of eggs. In two instances two hard-set eggs were found. None of the nests contained any lining but rotten touchwood. One nest within ten feet of the ground contained three hard-set eggs, on which the female was sitting. The male, who was caught in a similar hole in an adjoining tree, made no attempt whatever to claw or bite, but submitted to his fate with great meekness. The eggs are in shape and size almost exactly similar to those of *Carine brama*, but they are decidedly more glossy and have a more creamy tinge. The average dimensions of seven eggs measured were 1.34 by 1.13."

The eggs of all these Scops-Owls are undistinguishable. With a large series, one finds that in one species they average a little larger, and in another a little smaller, but single eggs of few of them are recognizably distinct. Those of the present species are the usual pure white, fairly glossy, very broad ovals.

**Scops lempiji (Horsf.). Horsfield's Scops-Owl.**

Scops lempiji (*Horsf.*), *Hume, Cat. no. 75* quint.

Major C. T. Bingham thus writes of this Owl in Tenasserim:—"Common in the Thoungyeen valley. I have myself neither seen nor heard it anywhere else.

" The call of this bird is peculiar for a *Scops*,—it is a long rolling hur-r-r-r, continued for minutes together. On the 11th March a Karen, who had been marking down nests for me in the Meplay valley, took me to a tree on the bank of the choung, and showed me a hole in the branch of a large pyma-tree (*Lagerstroemia flor-reginae*), in which he said a small Owl had its nest with three eggs.

On his ascending the tree a female of the above species flew out, which I shot. In ten minutes he brought me down three round white glossless eggs perfectly fresh, which he said were laid on the bare wood in a natural hollow in the branch. The hole was about three feet from the base of the branch on the underside, and about fifteen to twenty feet above the ground.

“I found a second nest in the hollow of a dead thingan-tree (*Hopea odorata*) near the bank of the Mekhnay stream, a feeder of the Meplay, on the 30th of the same month. The eggs, four in number, were similar, and like the others laid on the wood with no pretence to a nest. The seven eggs taken vary from 1·15 to 1·29 in length, and 1·07 to 1·12 in breadth.”

The eggs of all these Scops-Owls are alike. Major Bingham has sent me a series of the eggs of this species. They are very broad ovals, some almost spherical, pure white, the shell very smooth and soft to the touch, but, though some of the eggs were quite fresh, with in no case more than a very faint gloss.

**Carine brama (Temm.). *The Spotted Owlet.***

*Athene brama (Temm.),* *Jerd. B. Ind.* i, p. 141; *Hume, Rough Draft N. & E.* no. 76.

The Spotted Owlet breeds in February, March, and April; but the great majority of the birds lay in March.

Holes in old trees (scantily lined with a few dry leaves and feathers, decayed wood, or a little grass) are their favourite laying places; but holes in old buildings and clefts in rocks are sometimes resorted to. I remember Mr. Brooks telling me that in his office at Etawah two Rollers (*C. indica*) had chosen a hole, or rather spot, to build in, on the top of the central wall of a gable roof, just under the main longitudinal beam. Two of these Owlets came and determined to breed there, and after a couple of days' fighting and screeching, &c., the Owls took possession of the Rollers' comfortable nest and there laid. The Rollers went round the corner of the same house, chose a new hole, built a new nest, and bred there. Generally, when met with out of holes in trees, their nests are more substantial than when in the latter; and in such cases I suspect the nests are more often theirs by right of conquest than by construction.

Mr. W. Blewitt writes:—“I took four nests of this bird between the 16th and 21st March. Two contained three, and two four eggs, one set of the latter only being at all incubated. The nests were in decayed hollows of sheeshun, jamun (*Eugenia jambolana*), and neem trees; the eggs were in each case more or less bedded in dry leaves, or feathers, or both.” On another occasion he wrote:—“I found several nests of this species near Hansie in the latter half of April. They were in holes of peepul and siris trees, and each contained three eggs laid upon a few blades of straw with a few dry leaves or feathers.”

Writing from Sambhur, Mr. R. M. Adam remarks :—“ This bird is very common. A pair have their nest in the thatch of my house.

“ On one or two occasions I have shot one of the pair, and found a mate occupying its place within the next two or three days.”

They lay four or five eggs, most commonly the former.

Mr. G. Reid obtained eggs of this species at Lucknow on the 24th March.

Major Bingham writes :—“ This Owlet breeds at Allahabad in February, March, and April, and at Delhi in March and April. I have taken eggs from the thatch of houses, from holes in trees, and from holes in ruins. Nest there is none, but the holes are lined with feathers, grass, and leaves. I have taken as many as five eggs out of one hole, but I think three is the ordinary number laid.”

Writing of Rajpootana in general, Lieut. H. E. Barnes says :—“ The Spotted Owlet breeds from the middle of February to the commencement of April.”

Mr. Scrope Doig writes from Sind :—“ Got nests between 25th March and 6th April, greatest number of eggs in one nest was four. Nests situated in holes in old decayed trees.”

Colonel Butler sends the following note :—“ The Spotted Owlet breeds in the neighbourhood of Deesa in February and March. I found a nest on the 21st February, 1876, containing three fresh eggs. It was placed at the top of a pillar supporting the verandah of a bungalow. I found another nest in the hole of a tree about ten feet from the ground on the 25th February, containing also three fresh eggs ; another nest in the hole of a tree on the 26th February, containing four slightly incubated eggs. Two old birds flew out of the hole, and when I looked in I saw the hen bird sitting, and had to poke her with a stick before she would leave her eggs. The man who pointed the nest out to me, told me that when he tapped the tree the day before *three* old birds flew out (in what capacity was No. 3 acting?). In each case the nest consisted of an accumulation of dry sticks, felt, feathers, and other materials, formed into a thick pad with a broad depression in the centre for the eggs. Both of the parent birds seem to co-operate in nidification, evincing great anxiety if the nest is approached. The cock bird is usually in the same hole as the nest, or close at hand keeping guard whilst the hen is setting. I have eggs from the Deccan taken on the 7th and 22nd February.

“ I examined a hole under the eaves of a house in Belgaum, frequented by a pair of these birds, on the 7th March 1880, and found a single fresh egg. I caught the old bird on the nest, and after holding her for a few seconds put her back on the nest. On the 11th inst. I revisited the nest, and as before found the old female sulking up in a corner of the hole close to the eggs, which had increased to two. There was no sign of a nest, the eggs resting simply in a shallow saucer-like depression, scratched out of the mortar by the old birds. Had she been disposed to do so, the bird

I caught could have easily escaped on both occasions, but I suppose the attachment for her eggs induced her to remain by them. A friend of mine this year found a nest in the hole of a tree occupied by a pair of these birds, containing two eggs of the Owlet and one of a Paroquet, *P. torquatus*, and as a portion of the remains of a paroquet were also found in the hole, it is assumed that the Owlets attacked the paroquet and killed her on the nest, and after the dark deed took possession of the nest for themselves. All three eggs were fresh, as also the remains of the Paroquet."

Writing from the Deccan, Messrs. Davidson and Wenden remark :—" Very common. Breeds January to middle of March. Generally lays four to five eggs, but D. noticed *three* birds sitting on two eggs in one hole!"

Mr. G. Vidal says :—" Rare to the north of the tract, but comparatively common to the south about Vengorla.

" Two nests found in January and February, one in an ain tree (*Terminalia glabra*), and one in a cocoanut tree ; in one four hard-set eggs, and in the other two fresh eggs. Two other nests in February, with in each three fresh eggs."

Mr. Benjamin Aitken writes :—" In the first week of March 1869, four eggs were taken from a nest in a mango-tree ; a month after there were three more eggs in the hole. This was in Akola, Berar. In November 1871, at Poona, a pair of *Carine brama* held tenacious possession of a hole under the roof of an old house, but it was impossible, from the position of the hole, to ascertain if there was a nest."

Writing of Manzeerabad in Mysore, Mr. C. J. W. Taylor remarks that this Owlet is " very common. Breeding in April. Eggs taken on the 1st and 27th April, 1883."

Typically the eggs of *Carine brama* are oval. In some cases, broad and approaching the normal Owl shape, but more commonly only a moderately broad oval, differing little in colour, size, and texture from those of some of our Green Pigeons, and some of the smaller specimens positively undistinguishable from large eggs of *Turtur risoria*.

The eggs are when blown a beautifully pure white ; but until blown have, when quite fresh, a beautiful pink tinge ; and when a good deal incubated, are an opaque marble-white. Most of them are of a close, uniform, satiny texture, but a good many are thickly covered in part or whole with minute pimples, if I may use the word, white, but, owing to the shell there being thicker, of a rather deeper white than the ground.

The eggs vary from 1.15 to 1.45 inch in length, and from 0.93 to 1.1 inch in breadth ; but the average of fifty-four eggs measured was 1.25 by 1.04 inch.

*Ninox scutulata* (Raffl.). *The Brown Hawk-Owl.**Ninox scutellatus* (Raffl.), *Jerd. B. Ind.* i, p. 147.

Mr. Hart, who kindly sent me an egg of this species from Ceylon, writes:—"This egg was on an irregular bed of dried leaves in a hollow of a dead cocoanut-tree, at a height of about 25 feet from the soil. This spot seemed to be an old abandoned garden."

The egg is of the usual type, pure white, with a fine compact but scarcely glossy shell, and in shape nearly spherical. It measures 1·45 by 1·27 inch.

Colonel Legge remarks in his 'Birds of Ceylon':—"A nest, containing one nestling, was found by Mr. MacVicar in April 1873 near Bopé. It was situated in a hole in a mango-tree, about 15 feet from the ground; at the bottom of the cavity there were no materials, the chick reposing simply on the dead wood of the tree."

*Glaucidium brodiei* (Burton). *The Collared Pigmy Owlet.**Glaucidium brodiei* (Burt.), *Jerd. B. Ind.* i, p. 146.*Tænoptynx brodiei* (Burt.), *Hume, Rough Draft N. & E.* no. 80.

The Collared Pigmy Owlet breeds, so far as we yet know, only in the Himalayas, the Khasia Hills, and the long range that runs down from these towards the Malay Peninsula.

It lays in May and June, in hollows of trees. It makes little or no nest, though a hole I examined in July, containing four young ones, seemed to have been sparsely lined with feathers.

The eggs are doubtless four in number, nearly round and pure white, but I have never yet myself obtained any.

The following is Captain Hutton's account of its nidification:—"It lays its eggs in hollow trees without any preparation of a nest. On the 11th May, 1848, I found three young ones and an egg just ready to hatch in a hole of a wild cherry tree. The egg was nearly round and pure white; but being broken, I could take no measurement of it. The young ones were clothed in a soft and pure white down. The old female remained in the hole while we cut into the tree, and allowed herself to be captured."

Mr. R. Thompson writes:—"This species breeds from May to July, generally in holes in oak trees. I have usually met this bird with three young ones. In September the young are quite fledged."

Writing from Murree, Colonel Marshall says:—"We were unable to find the eggs of this species, but on the 22nd of June we secured three full-fledged young ones in a hole in a dead tree. We managed to rear these until about the middle of October, when they died suddenly, I fear, from too high feeding. The nest was at an elevation of between 5000 and 6000 feet."

**Glaucidium castaneonotum (Blyth).***The Chestnut-backed Owl.***Glaucidium castaneonotum (Bl.), Hume, Cat. no. 78 bis.**

Colonel W. V. Legge, writing to me from Ceylon on the nesting of this Owl, says :—

“ I have lately had the eggs of an Owl sent me from the Colombo Museum for examination. They were taken from a hole in a cocoanut-tree in the Western Province by the taxidermist, who is well acquainted with our Chestnut-backed Owl. He identified the bird, and therefore I think I may describe the eggs as *bonâ fide* those of our handsome little Owl. They were taken in July. In shape they are ovals, equally rounded at both ends. They differ much in size, one having an axis of 1·41 and a diameter of 1·15, the other measuring 1·34 by 1·08 only.”

**Glaucidium radiatum (Tick.). *The Jungle Owl.***

*Athene radiata* (Tick.), *Jerd. B. Ind.* i, p. 143; *Hume, Rough Draft N. & E.* no. 77.

The Jungle Owl is confined to the more jungly and forest-clad tracts of both the plains and the lower hills.

It breeds in the early part of the hot weather, laying in April and May, in holes in trees. Though I have twice found nests containing young ones, I have never myself taken the eggs.

Mr. R. Thompson, writing from Gurhwal, says :—“ This species breeds in May and June in holes in small trees. It is very common in all the warmer valleys. Young birds are quite fledged in June; from three to four young ones at a time.”

Mr. J. Cockburn writes from Allahabad :—“ A clutch of three eggs of this Owl were taken by me on the 21st March out of a hole in a horseradish tree in my garden, into which I had frequently seen the bird enter. The eggs are thinner, smaller, and more transparent (with, when fresh, a pinky look) than those of *Carine brama*. The bird is common in this, the old side of the Cantonments; it has a rather pleasing cry, not unlike the distant call of the Sarus Crane, which it occasionally utters in the daytime.”

Colonel Butler remarks :—“ Mr. J. Davidson sent me two eggs taken at Akrani, Khandesh, 17th and 19th April, 1881, respectively.”

Mr. J. Darling, junior, says :—“ I found a nest of this bird on the 12th March, 1870, at Coonoor; it was about 20 feet from the ground, in a hole in the trunk of a tree, in a rather open jungle. The hole was about 6 inches in diameter and 28 deep; there was no nest, and the eggs, two in number, were laid on some soft wood-scrapings.”

Mr. Iver Macpherson, writing from Mysore, says :—“ 19th March, 1880. In a hole of a decayed and dry tree, some 12 feet from the

ground, found three hard-set eggs of this small Owlet. Shot the bird as it flew out.

"20th March. Observed one of these Owlets fly out of a hole in a large tree some 20 feet up. Sent up a Cooroobor to inspect, who reported only one egg, which I left.

"Returned again on the 22nd, the bird was at home, but had laid no more eggs, so I took the one, which proved to be very hard-set."

The eggs are pure white, smooth and satiny to the touch, but with scarcely any gloss. They are very broad ovals as a rule, though some slightly more elongated varieties are met with, and they vary from 1.2 to 1.31 in length and from 1.0 to 1.11 in width.

**Glaucidium malabaricum** (Blyth). *The Malabar Owlet.*

*Athene malabarica*, Blyth, *Jerd. B. Ind.* i, p. 144.

*Glaucidium malabaricum* (Bl.), Hume, *Cat.* no. 78.

All I know of the nidification of the Malabar Owlet is contained in the following note by Mr. G. Vidal.

He writes from the South Konkan :—"Rather common throughout the district in well-wooded parts. Calls loudly by day as well as night. I have seen one, in the full blaze of the sun, make a sudden dash out of a tree at a *Phylloscopus* I had shot, and which was fluttering slowly to the ground.

"My shikaree brought me two fresh eggs with the parent birds on the 14th April.

"Dr. Armstrong also got a nest in March with three eggs, scarcely distinguishable, as far as I could judge, from those of *Carine brama*, in size, shape, tone, or texture."

**Glaucidium cuculoides** (Vigors). *The Barred Owlet.*

*Athene cuculoides* (Vig.), *Jerd. B. Ind.* i, p. 145; Hume, *Rough Draft N. & E.* no. 79.

The Barred Owlet lays from March to May; its eggs, four in number, are always deposited in some hollow or hole in a tree, without any nest or at most a mere apology for one in the shape of a few dead leaves or a little touchwood.

Captain Hutton says :—"I have found the nest of this species in the neighbourhood of Mussoorie, at elevations of between 5000 and 6000 feet. The eggs, three (or four) in number, round and pure white, are deposited in holes in trees, without nest."

Major Cock, writing from Dhurumsala, says :—"I found their nests on three occasions, always in hollow trees. On two occasions there were four eggs in each nest, and the other time four young ones. Nests in hollow hill-oaks some 20 to 30 feet from the ground. There was no lining to the nest, just a few dead leaves that might have been in the hollow accidentally. Eggs on each occasion varied

in shape; but each nest of eggs retained its own characteristics: thus in one the eggs were all more spherical, in the other more oval."

Mr. R. Thompson, writing from Gurhwal, says that this species "breeds in May and June, in holes in large trees. It is quite as common as *G. radiatum* in these forests, but has not the active sanguinary habits of the other. Many breed in the oak and fir woods above Khooratal. I had the young brought me once in June some three years ago."

From Sikhim Mr. Gammie writes:—"On the 9th May I took three fresh eggs out of the hole of a dead tree, some twenty feet up, at the elevation of 2000 feet above the sea. It stood in the middle of a thick patch of living trees. The only nesting-material was a few of the soft rotten chips which may have been accidentally left inside."

Major C. T. Bingham, writing from Tenasserim, remarks:—"The first nest I found of this species was at Meeawuddy on the 12th April; it was placed in the hollow of a small pynkado tree (*Xylia dolabriformis*), and contained three fresh eggs lying on a few chips of decayed wood, leaves, and feathers. I did not clearly see the bird as it left the nest nor was I able to secure it.

"Subsequently, on the 23rd of the same month, a Karen led me to a nest-hole of this bird, placed in the hollow of the stump of a teak that had been felled years ago; this was on the Meplay choung. In this case I secured the female alive and two fresh eggs out of four, two breaking in the scuffle with the hen; lining of the nest-hole similar to the first.

"Again, on the 2nd May at Pynekyoon on the Hlinebooey, I found two eggs and two young ones in the hollow of a dead cocoanut tree. No semblance of lining or nest was there, but balls of the bird's *dejecta* lay with the eggs and young ones. One egg was quite fresh, the other slightly sat upon.

"The six eggs from the three nests measure respectively:— $1\cdot38 \times 1\cdot19$ ,  $1\cdot30 \times 1\cdot18$ ,  $1\cdot33 \times 1\cdot17$ ,  $1\cdot30 \times 1\cdot15$ ,  $1\cdot33 \times 1\cdot16$ , and  $1\cdot30 \times 1\cdot18$ ."

The eggs which, as might be expected, are pure white and glossy, are rather large for the size of the bird. In shape they vary from almost perfect spheres to broad ovals.

The eggs that I have measured varied from  $1\cdot38$  to  $1\cdot48$  inch in length, and from  $1\cdot17$  to  $1\cdot24$  in breadth; the average of twelve eggs being  $1\cdot41$  by  $1\cdot19$  inch.

### *Syrnium sinense* (Lath.). *The Malayan Wood-Owl.*

*Syrnium seloputo* (Horsf.), *Hume, Cat.* no. 65 bis.

Mr. Oates writes of this species from Pegu:—"I have not been fortunate enough to get the eggs of this species, but I have twice found the young birds. The eggs appear to be laid on the bare wood in the fork of a large peepul-tree at no great distance from

the ground. A young bird, about one month old, and just able to fly, was taken on the 20th April, and another one rather younger on the 24th March. Eggs should, therefore, be looked for at the end of February and the commencement of March."

**Syrnium ocellatum, Less. The Mottled Wood-Owl.**

*Syrnium sinense* (*Lath.*), *Jerd. B. Ind.* i, p. 123.

*Bulaca ocellata* (*Less.*), *Hume, Rough Draft N. & E.* no. 65.

The Mottled Wood-Owl lays in the plains of the North-Western Provinces and the Punjab, in February and March, but I have a note of the eggs having been taken in the Doon early in April. In the Central Provinces it lays from November to January.

Its eggs are deposited at heights of from 8 to 25 feet from the ground, in some large cavity, or in the depression at the fork of two or more huge branches, of some old peepul or mango tree. There is no nest, so to speak, but a little dry touch-wood, a few dead leaves, or a little earth covering the floor, if I may so call it, of the nesting-place, forms a scanty bed for the eggs.

I have more than once shot the male sitting on the eggs. Mr. W. Blewitt writes:—"I found a nest near Hansie in a hollow of a peepul-tree about 19 feet from the ground, on the 16th of March. The nest-hole, which was lined with leaves, contained two partially incubated eggs."

Mr. Brooks says that on the 3rd of March 1867 he "took a pair of eggs out of a nest in a mango-tree. The nest was in the fork of two huge branches about 20 feet from the ground. There was a little earth and a few dry mango-leaves. The eggs were pure white and very round."

Writing from Raepore (Central Provinces), Mr. F. R. Blewitt remarks:—"This Owl certainly breeds from November to January. On the 5th December, 1870, I secured for the first and last time the eggs of this species in the Toomgaon (Raepore Districts) open forest. At a height of some 12 feet from the ground, the trunk of a kaim tree (*Nauclea parviflora*) had divided into two branches, and in the open cavity between these two, which was nearly 2 feet deep, were deposited three fresh eggs, on some loose dry touch-wood and earth. I have occasionally met with this Owl, but only in the Raepore, and not in the Sumbulpore, District. Mango topes are its favourite haunts, though an occasional pair may be met with in open forest."

Two is the ordinary number of eggs laid; indeed there were two eggs (in three instances more or less incubated) in every one of the seven nests of which I have notes.

The late Major Cock wrote to me:—"I took this bird's eggs upon the 20th March, 1875, at Sitapur in Oudh. I had been looking about for *Ketupa ceylonensis*, some pairs of which were always found there, when I saw in the fork of a mango about 15 feet up what I took to be the wing of some dead bird. Looking closer I could not make it out exactly, so I pitched a stone up; but as it

did not move I sent a man up to throw it down, when a bird flew off the tree, and I saw it was *Syrnium ocellatum*. The man said there were eggs, so up I went, and saw two lovely fresh eggs lying in a hollow between the forks of some boughs, upon some dead leaves ; leaving the eggs I sent my men away, and sat down some 20 yards off behind a tree ; the old bird soon returned, and as she flew into her nest I shot her. These are the first and only eggs I have ever taken of this bird. The eggs are white, a blunt pyriform oval, and of delicate texture ; the two eggs are similar in size and shape."

Messrs. Davidson and Wenden remark of this Owl in the Deccan :—" Observed and shot at Barsee, in May. D. has also seen it at Akulkote. It is very common in Satara, where a nest with one fresh egg was taken on 8th February, and another nearly perfect egg was taken out of the female."

And Mr. J. Davidson, writing of Western Khandesh, says of this species :—" It breeds in December as a rule, but I obtained eggs at Bhadgaum as late as February."

Mr. G. Vidal, writing from the South Konkan, says :—" Three nests were found in January with two young birds or eggs in each, all in hollows of mango-trees."

The eggs of this species are generally a very round oval, white, with, in many instances, a very delicate creamy tinge. From the eggs of *Bubo bengalensis* it is scarcely possible to separate them ; although *B. bengalensis* is a considerably larger bird, its eggs, as regards size, shape, and texture, seem almost identical with those of the present species. All that I can say, with an ample series of both before me, is that, as a body, the eggs of *B. bengalensis* are a mere trifle larger, and have more gloss than those of *Syrnium ocellatum*. For the size of the bird, the eggs of the present species are somewhat large.

In length they vary from 1.86 to 2.1 inches, and in breadth from 1.6 to 1.75 inch ; but the average of thirteen eggs measured was 1.99 by 1.67 inch.

#### *Syrnium newarens* (Hodgs.). *The Brown Wood-Owl.*

*Syrnium newarens* (Hodgs.), *Jerd. B. Ind.* i, p. 122 ; *Hume, Rough Draft N. & E.* no. 64.

The Brown Wood-Owl of the Himalayas, so far as I yet know, lays in May. I have only seen one nest, which was in a deep, wooded, precipitous little valley or khud, at the back of Mahasoo (near Simla). Contrary to what might have been expected, it was placed on a shelf projecting from the face of a low precipice ; immediately above it projected a large point of rock, from which depended a perfect curtain of bushes, which reached the tops of the trees growing at the foot of the precipice. The nest, the Paharees said (I could not get up to it myself), was composed of sticks, with a few feathers intermingled ; it was completely hidden from sight by the bushes and rocks above and below, and contained, on the 6th of June, three very young birds.

The female was fired at, but not obtained at the time ; weeks afterwards, her remains were found, hanging in the moss and ferns of a tree, some distance down the valley, utterly rotten and spoiled.

The male brought the young ones up, and, on the 10th of October, I shot him and one of the young ones, then as nearly full-grown as might be.

I am indebted to the late Mr. Mandelli for an egg of this species which was accompanied by the following note :—" On the 5th of March one of my shikarees brought in a Brown Wood-Owl, which he had shot in Native Sikhim the previous day. On examining the poor bird it proved to be still living, and on his placing his foot on the breast to give its *coup de grâce*, this egg was expelled."

The egg is pure white, of a very broad oval, almost subspherical in shape, and has a very fine, but only faintly glossy, shell. It measures 2.07 by 1.76 inches.

## Order ACCIPITRES.

### Family FALCONIDÆ.

#### Subfamily ACCIPITRINÆ.

*Circus aeruginosus* (Linn.). *The Marsh-Harrier.*

*Circus aeruginosus* (Linn.), *Jerd. B. Ind.* i, p. 99; *Hume, Rough Draft N. & E.* no. 54.

Two eggs, said to belong to the Marsh-Harrier, were brought me from Southern India by Mr. Davison ; they were given him by Mr. Rhodes Morgan of the Forest Department, who vouched for their authenticity. They were a rather broad, very regular oval, quite devoid of any gloss. The ground-colour is white, and both have a good number of markings—in the one minute specks and spots chiefly at one end, the other with numerous pretty large blotches and irregular smears ; in both cases very pale brown. This second egg is very much more profusely marked than any European specimen I have yet seen, and the ground-colour lacks the faint greenish or bluish-green tint that one is accustomed to. They are said to have been found in the Kurnool District on the banks of the Kistna. They measure 1.82 by 1.49 inch, and 1.89 by 1.58 inch.

It seems probable that this species breeds in the plains of India in suitable localities. In the jheel-studded tract of country lying partly in the Mynpooree and partly in the Etawah District, I, many years ago, shot a large adult and saw several others quite at the close of May. An unusually heavy rainfall had filled all the lakes, or, as we should call them in Norfolk, *broads*, to overflowing, and the unsettled state of the country had, in a great measure, prevented the customary agricultural drain on them, and many of them, commonly dry at this season, were still extensive sheets of water. I can scarcely doubt that these birds bred there that year.

In Oudh, native fowlers informed me that they bred in swampy grounds, Trans-Gogra. Mr. F. R. Blewitt, writing from Jhansie, in the neighbourhood of which there are several considerable lakes, says that he has procured the Marsh-Harrier there throughout the hot weather and rains.

**Astur palumbarius** (Linn.). *The Goshawk.*

*Astur palumbarius* (Linn.), *Jerd. B. Ind.* i, p. 45; *Hume, Rough Draft N. & E.* no. 21.

The Goshawk breeds in India, so far as I have been able to ascertain, only in the higher regions of the Himalayas, in the immediate neighbourhood of the snows.

Two eggs of this species which I possess were found in a nest about 40 feet from the ground, in a deodar-tree in Bussahir, on the 15th of April, at an elevation of about 9000 feet. They are short, broad ovals, slightly compressed towards one end, glossless, of a greyish-white colour. They were much incubated, and one of them is a great deal mottled and spotted with faint brown stains, whether natural or the result of dirt during incubation, I do not know. Held up against the light, the shells are a bright sea-green. These eggs were taken by a native, whom I have always found reliable in the matter of eggs, and brought to me along with one of the parent birds, the female. I have myself no doubts as to their authenticity.

They measure 2.2 by 1.78 inch and 2.1 by 1.7 inch.

A pair of very young birds were brought late in July, while I was at Simla, for the Rajah of Putialla, from near the Chor, and the shikaree asserted that he had taken them out of a nest placed near the top of some kind of fir or pine tree.

Mr. R. Thompson, an enthusiastic falconer by the way, tells me that "they breed from March to June, building on trees a large circular nest of coarse twigs, in which they lay three or four nearly pure white eggs. They confine themselves peculiarly to the interior of the deep, precipitous, woody valleys, lying close to the snowy peaks. They usually, I am told, select a birch-tree, *Alnus boojputtia*, or *Cupressus tomentosa*, to build their nests on."

"During this period the birds are very daring, and will readily

attack a man attempting to climb up to the nest. In these woods the Moonal Pheasant is very abundant, and no doubt affords capital quarry for these Hawks."

**Astur trivirgatus** (Temm.). *The Crested Goshawk.*

*Astur trivirgatus* (Temm.), *Jerd. B. Ind.* i, p. 47; *Hume, Cat. no. 22.*

Mr. Mandelli's people found a nest of this species below Man-tchu in Native Sikhim, on the 2nd of May, 1876. The nest was a large mass of small sticks placed about 40 feet from the ground on a high tree. It contained two fresh eggs. The eggs were perfect and regular ovals. The shell full of pores and glossless like a Goshawk's. Held up against the light, it was the usual green. The ground-colour of the egg is a pale greenish white, but the greater part of the egg has been very much soiled and discoloured either in the nest or owing to the eggs not having been blown till they were rotten.

The eggs measure 2·0 in length by 1·54 in breadth.

Mr. T. Fulton Bourdillon, writing from Mynall in S. Travancore, says:—"A nest with two nearly-fledged birds, taken 14th April. The nest was placed in a tree at a distance of 30 or 40 feet from the ground. It was loosely constructed and lined with leaves which must have been fresh when the eggs were laid."

**Astur badius** (Gmel.). *The Shikra.*

*Micronisus badius* (Gm.), *Jerd. B. Ind.* i, p. 48; *Hume, Rough Draft N. & E.* no. 23.

The Shikra breeds pretty well all over the plains of India, and in the Himalayas up to a height of 5000 feet, or possibly more. I found a nest with young ones many years ago at the back of Landour at fully this elevation; and writing from Murree, Colonel C. H. T. Marshall remarks:—"On May 18th I took a nest belonging to this species, containing two bluish-white eggs, from the top of a high pine-tree."

The Shikra lays in April and May, and in the Central Provinces in June also, building for itself a moderately-sized nest on trees, large and lofty ones being, as far as my experience in the plains goes, always selected.

Writing from Gurhwal, Mr. Thompson says:—"This is a regular breeder in our forests, and always chooses trees standing on the edges of streams or stagnant pools. The birds are very fond of frogs, which they are constantly stooping at. They are noisy and quarrelsome, if any large bird approaches their nest."

The nest is usually placed in a fork high up, and near the top of the tree. It is but loosely built of twigs and smaller sticks, lined with fine grass-roots; is much smaller and less compact than

those of the Toorumtee (*Falco chicquera*) often are, and may average about 10 inches in diameter.

These little Hawks take, I should say, a full month in preparing their nest, only putting on two or three twigs a day, which they place and replace, as if they were *very* particular and had a great eye for a handsome nest; whereas, after all their fuss and bother, the nest is a loose ragged-looking affair, that no respectable Crow even would condescend to lay in.

The greatest number of eggs I have taken in a nest was four; but I am inclined to think that the generality only lay three.

In Sind, Mr. Scrope Doig tells us, he "found nests of this bird on the 22nd and 29th of April, each containing three eggs. Nests situated high up in kundy trees growing in the middle of dense thick tamarisk jungle."

Colonel Butler writes:—"I found a Shikra's nest at Deesa on the 24th May, 1876, containing three young birds almost ready to fly. I should say they were about six weeks old, in which case the eggs were laid probably about the last week in March. The nest looked much like an old Crow's nest, and was built upon a tree growing in one of the compounds in the camp, about 30 feet from the ground.

"Mr. J. Davidson sent me some eggs taken at Akrani, Khandesh, 16th April."

The late Mr. A. Anderson had the following note in the P. Z. S.:—"In modification of my former experience, I have now to record the occurrence of a *slightly* marked egg from a clutch of three. Five out of six nests which were taken in my presence this last summer were built on the parasitical shrub (*Loranthus globosus*?) which grows to such perfection on mango-trees. The branches of this so-called mistletoe radiate sideways and upwards to a considerable height above the parent tree, from a large excrescence or knob, thus forming, as it were, the outer structure of a ready-made nest. Viewed from below the nest looks about the size of what the common Crow would build; but on examining one I had cut down (the parasitical plant was four feet above the tree), it was clear that the nest itself was particularly small, and so clumsily made as to fall to pieces on being removed from the knob which supported it. A better situation for a nest than the centre of a clump of this parasite could hardly be conceived."

He subsequently wrote:—"By the eggs of this Shikra being 'slightly marked,' of course it must be understood that the colouring-matter consists of very minute specks of reddish brown, and that it in no way approaches to the richly-marked eggs of the European species, *Accipiter nisus*; *Astur badius*, oologically considered, having its affinities with the Goshawk and not with the true Sparrow-Hawks.

"Admitting my weakness for oological discoveries, I must not omit to mention that on April 12th last (1876) I took a clutch of five eggs of *M. badius*, which is in excess of the number that has hitherto been recorded. Another sitting of four, taken three days

later, are all freely marked with minute specks of a reddish-brown colour. I venture to say Mr. Hume is in error in assigning only *three* eggs to this Hawk as a general rule (see first ed. 'Nests and Eggs,' pt. 1, p. 25); for, according to my experience, *four* is the normal number if the bird is allowed time to lay the full complement."

Mr. G. Vidal says of this Hawk in the S. Konkan :—" Common everywhere about villages and groves of trees. Breeds in March and April."

And Messrs. Davidson and Wenden, writing of the Deccan, remark :—" Common at all seasons. Nest with two fresh eggs found in a mango-tree on 31st March, 1875."

Mr. Benjamin Aitken has favoured me with the following note :— " Early in May 1870, at Akola (Berar), a pair of Shikras had four white eggs in an old Crow's nest up a large tamarind-tree. Two of the eggs were taken, and after the other two had been hatched, the young birds were taken. The parent birds laid again at once, and on the 9th June three hard-set eggs were taken from the same nest."

" At the end of the same month of May, a nest with four young birds was found in a mango-tope—also at Akola.

" In June the previous year (1869) four young birds escaped from a nest in a large tamarind-tree, about 200 yards from the site of the first-mentioned nest. In this case the nest was placed in one of the outermost branches and was only halfway up the tree."

The eggs do not vary much in shape. They are a little shorter and stouter than those of *Falco chicquera*. They are oval or somewhat pyriform, a rather longer egg in proportion to its breadth than one expects to find in this class of bird. They belong to the Goshawk and not to the Sparrow-Hawk type. Smooth, fine, glossless shells, of a pure, delicate, pale bluish white, as a rule absolutely devoid of markings; at most, thinly sprinkled all over with very faint greyish specks and spots, thus differing widely from the apparently closely allied *A. nisus*, whose eggs are often richly, and always, I believe, more or less marked.

In size the eggs vary from 1.41 to 1.65 inch in length, and from 1.12 to 1.32 in breadth; but the average is 1.55 by 1.22.

### *Astur poliopsis* (Hume). *Hume's Shikra.*

*Astur poliopsis*, *Hume*; *Hume, Cat.* no. 23 bis.

Writing from Cachar, Mr. J. Inglis remarks :—" This Hawk is perhaps more generally met with than any other; it breeds during March and April."

Mr. J. R. Cripps remarks of this Hawk in Eastern Bengal :— " On the 18th April, 1878, I found a nest of one of these birds which contained one very slightly-incubated egg; it was built in a fork high up near the top of a peepul-tree, and was a ragged affair of twigs with an attempt at a lining of fine grass-roots,

principally of doob. The egg was devoid of markings but was soiled, evidently by the bird's droppings, in a few places. Another nest, which I found on the 15th of April, 1878, contained three partly-fledged young, and was situate on a mango-tree, near the top of the tree and about 25 feet from the ground; neither of these nests were in the vicinity of water."

Major Bingham writes from Tenasserim:—"Passing through a *tuungyah* or cultivation, belonging to a Karen of a village near my camp, I noticed a hawk fly off a nest placed on a large branch of a pymma tree (*Lagerstroemia flos regiae*) which grew horizontally out at a height of fully 40 feet above the ground; it (the nest) was rather difficult of detection, as it was placed above a large bunch of orchids which prevented it from being seen from below, and it was only by retiring to some rising ground two or three hundred yards off and using my binoculars that I made it out. After waiting for some time, and finding the bird did not return, I retraced my steps to my camp. This was on the 11th April.

"Next day I returned and secured the three eggs, very hard-set they were, which the nest contained, and shot the female as she sat on a neighbouring tree after flying off the nest. This latter was very like that of *A. badius*, a poor affair of sticks very loosely put together. The eggs, too, very much resemble those of its near relative."

To judge from these specimens, the eggs are rather longer than those of *A. badius*. They measure 1.69 by 1.24, 1.7 by 1.27, and 1.63 by 1.13; the average of a large series of *A. badius* is 1.55 by 1.22, and the longest I have measured was only 1.65 in length.

These eggs are the usual pale greyish-bluish white, devoid of real markings, though stained and dirtied here and there. The shells very fine and compact, but with very little appreciable gloss.

### **Accipiter nisus (Linn.). The Sparrow-Hawk.**

*Accipiter nisus* (Linn.), *Jerd. B. Ind.* i, p. 51; *Hume, Rough Draft N. & E.* no. 24.

Sparrow-Hawks, belonging probably to both the present and the next species, breed not uncommonly in wooded valleys in the interior of the Himalayas. I have repeatedly seen their nests, and once (in May) took one about two marches on the Mussoorie side of Gungootrie, containing four bluish-white red-blotched eggs, exactly like, it seemed to me, the Sparrow-Hawks' eggs I had so often taken as a boy at home.

I cannot now be sure whether these eggs belonged to the true *A. nisus* or to *A. melanoschistus*.

Captain Thompson of Simla assured me that one or two pairs of the true Sparrow-Hawk breed yearly in Annandale, just below Simla, laying in May and June.

I verified the fact of one pair breeding there last year, though I failed to secure the eggs.

At the same time the great majority of the present species do, unquestionably I think, go further north to breed. Dr. Stoliczka remarks :—“ Both the Kestrel and Sparrow-Hawk were common in the upper Lachen and Lachung valleys after the middle of September, evidently migrating southwards. None were seen on the Chola range at the end of August. The Kestrel was seen a few days sooner than the Sparrow-Hawk.”

This is quite my own experience ; a few pairs remain to breed all over the Himalayas in well-wooded localities, at elevations of from 5000 to perhaps 8000 feet ; but the vast majority go further north, and, with numberless young birds, begin to reappear in September.

The late Major Cock took three eggs of this species on the 2nd of June out of a nest in a tree near Soonamurg, in the valley of Cashmere. “ While watching birds in a pine wood on a hill-side near Soonamurg, Cashmere, I noticed some Hawk that now and again flew past the tops of the trees under which I was sitting ; whenever this occurred I heard the shrill cry of another bird, so I concluded a female was sitting somewhere near. After a diligent search I found the nest three-fourths up a high pine. My man got up to the nest, which was a ragged stick-nest with nothing characteristic about it, and announced three eggs, which I secured. I then waited and fired at the female as she came back, and to my great regret only wounded her. I waited for the other bird ; this I bagged, and it proved to be a male *Accipiter nisus*. ”

The parent bird, which I examined, is unquestionably an adult male *A. nisus*. One of these eggs is a very perfect rather broad oval. The shell is fine and compact, but there is no gloss. The ground-colour is a very delicate pale green, or greenish white, very boldly and profusely smeared, blotched, and spotted with a very rich reddish brown, and with a very few small faint purple clouds here and there underlying the primary markings. The larger end of the egg is nearly spotless, while of the remaining three-fourths of the surface fully half is occupied by the markings. I have seen richly-coloured Kite’s eggs which, except as regards size, closely resembled the egg above described, which measured 1.73 by 1.33 inch.

The other two eggs of the same clutch, now in Colonel Marshall’s collection, are considerably larger, measuring 1.82 and 1.83 inch by 1.35.

#### ***Accipiter melanochistus*, Hume. *The Dove-Hawk.***

*Accipiter melaschistus*, Hume ; Hume, Rough Draft N. & E. no. 24 bis.

This species, or race, as some will doubtless consider it, appears to be confined to the Himalayas. My own specimens are all from

within a circle of about 80 miles round Simla; but it is not a purely local race, as I have seen a typical specimen in Mr. Mandleri's collection in Darjeeling.

The Dove-Hawk is distinguished from the European *A. nisus* by its somewhat larger size (the males especially being noticeably larger than those of *A. nisus*), longer wings, and conspicuously more powerful tarsi, toes, and claws, and specially by the extremely black tint of the head and nape, which extends more or less on to the back.

The first eggs that I obtained of this species were taken out of a nest near Kotegurh, on the 28th of April, by Captain Blair. The nest was a very slight one of sticks, placed on a ledge of a high cliff. It contained two eggs very similar to, but perhaps a trifle larger and more elongated than, those of the common Sparrow-Hawk (*A. nisus*) generally are. In shape the eggs were somewhat elongated, nearly perfect ovals, only just perceptibly compressed towards one end. The ground-colour is a faintly bluish white. In both eggs one half of the egg is almost entirely spotless, whilst the greater part of the other half of the egg is occupied by a broad, irregular, mottled and blotched zone of a burnt sienna-brown, in spots becoming almost black. In neither egg does this extend quite to the end, and in one it is very much more strongly marked than in the other. In both a few faint pinkish-purple clouds or spots underlie or are intermingled with the brown marking of the zone. The texture of the egg is fine, but it has little or no gloss.

On the 29th of May I obtained a second nest near the same place, and very similarly situated as in the former case, only securing the female. The nest contained three eggs; one of these was of much the same type as the preceding; in one the primary markings were more generally distributed over the whole surface, were more broken up into specks and spots, freckles, and exhibited a number of large secondary pale purplish clouds. The third had the whole surface thickly speckled and spotted with a somewhat more reddish brown, and the whole smaller end blotched and smeared almost confluent with brownish red.

These five eggs varied in length from 1.65 to 1.75 inch, and in breadth from 1.27 to 1.3 inch.

### *Accipiter virgatus* (Reinw.). *The Besra Sparrow-Hawk.*

*Accipiter virgatus* (Temm.), *Jerd. B. Ind.* i, p. 52; *Hume, Cat.* no. 25.

From Sikhim Mr. Gammie writes:—"On the 17th of May I wounded a Hawk which rose off its nest, but unfortunately it fell among dense jungle and could not be found. The nest was a rather large platform of sticks, about as thick as a man's finger, fixed in the top of a leafy tree in a wooded valley at 2500 feet elevation. Not having procured the bird, I cannot speak with

absolute confidence to its identity, but do not think I am mistaken. I had two good views of it before firing. In rising out of the nest it dropped down to within a few feet of the ground, close to where I stood, which enabled me to see its back quite distinctly, and a few minutes after it returned overhead, when I wounded it.

"The nest contained four partially-incubated eggs."

The eggs sent by Mr. Gammie were of the usual Accipitrine type, moderately broad regular oval eggs, with a fine compact, but entirely glossless shell. The ground was a dead white, but very much soiled and stained by the droppings of the birds. One egg was covered about the large end with several huge blotches and a number of good-sized spots of a dark umber-brown, with only a few specks and spots of the same colour about the rest of the egg.

A second egg was similar, except that in this all the markings were about the small end.

A third egg had only one moderate-sized blotch and a few spots of the dark colour about the large end, but the greater portion of the larger end was clouded with dull, pale, subsurface-looking purplish brown, and there were splashes and streaks of the same colour in other parts of the eggs.

The fourth egg had no dark-coloured markings at all, only numerous specks and spots and little blotches of a very pale greyish purple.

The eggs varied from 1·53 to 1·56 in length, and from 1·18 to 1·2 in breadth.

Colonel Legge says:—"In Ceylon this Hawk breeds about the month of May, during which I once procured a female containing an egg almost ready for expulsion."

Mr. H. Parker also writes from Ceylon:—"One nest of this Sparrow-Hawk, found in June, was situated on a small tamarind-tree overhanging the main road. It was about 35 feet from the ground in a vertical fork among the small twigs on the top of the tree, and in appearance resembled the ruins of a Crow's nest. It was constructed of small sticks and twigs, without any lining, and was a very thin, ragged structure; all but the centre could be seen through. It was about 18 inches wide exteriorly, and the saucer-shaped egg-cavity was 9 inches across. It contained one nestling."

### Subfamily BUTEONINÆ.

**Buteo ferox** (S. G. Gmel.). *The Long-legged Buzzard.*

*Buteo canescens*, *Hodgs.*, *Jerd. B. Ind.* i, p. 88.

*Buteo ferox* (Gm.), *Hume, Rough Draft N. & E.* no. 45.

The Long-legged Buzzard is said to breed in the North-West Punjab, and certainly breeds in the interior of the Himalayas west of the Ganges, as in Bussahir, Kooloo, and Kashmere.

Mr. W. Theobald makes the following note of this bird's breeding in the neighbourhood of Pind Dadan Khan and Katas in the Salt Range:—"Lays in the first and fourth weeks of March. Eggs two or three; shape ovato-pyriform; size varies from 2 to 2·19 inches in length, and 1·66 inch in breadth; colour greenish white, or white blotched with red or claret-brown, vary greatly. Nest large, in trees; sticks, lined with cotton, rags, &c., and daubed with mud."

Of their breeding in the valley of Kashmere, he says:—"Lays in the fourth week of April; eggs two in number, ovato-pyriform, measuring from 2·1 to 2·4 inches in length, and from 1·77 to 1·8 inch in breadth. Nest and eggs as in plains."

I have been unable to verify the fact of this species breeding in the Salt Range. I have had men at work there for two years in the very locality noticed by Theobald, and yet they failed to see a single nest. The late Major Cock, beyond question the best bird-nester in India, equally failed to obtain either eggs or nest in the Salt Range, but he succeeded in finding the nest at Nowshera. He writes:—

"I sent a full account of my taking the nest of this bird to the 'Pioneer' at the time, but whether the account ever appeared I do not know, and I have since regretted that at the time I did not send the account to 'Nests and Eggs of Indian Birds' instead, as I have now only my memory and the egg to aid me in this present note. In April 1872, while out after eggs at Nowshera, I observed a pair of *Buteo ferox* about a high cliff that overlooked a dry ravine about three miles from the station; three days after this a Pathan told me that a large bird had a nest on this cliff. I went with him, and looking over the cliff could see the sticks of which the nest was composed, but not the interior of the nest, because of the overhanging ledge. Throwing down some pebbles, the old bird flew off the nest, and I saw it was a *Buteo ferox*; she flew across the ravine and settled on the edge of a cliff opposite. By means of a rift in the face of the precipice the Pathan got down to the ledge on which the nest was placed, and with the aid of the rope got to the nest, in which were two eggs. I told him to leave the eggs, and I went down below under the cliff and sat down. The old bird soon returned and seated herself on the eggs. Calling out to the Pathan to fling down pebbles, I prepared to shoot her, which I did as she flew off the nest. I now went up and took the nest, which was a moderately large structure of sticks placed under an overhanging ledge, about 80 feet up; the nest was lined with dry twigs and contained two fresh eggs, much like Kite's eggs, only larger. I look on these eggs as one of the greatest prizes I have ever taken, and had I not seen the bird twice on the nest and shot it, and taken the eggs myself, I should never have believed in the breeding of *Buteo ferox* in the plains of India. I may here mention that for many days after this I carefully searched all the cliffs and precipices within a radius of 15 miles, and I did not even observe the birds, much less find another nest. I found the

nests of the Kestrel, the Lugger, and the Neophron, and saw the old nests of the Lammergier, but no more nests of *B. ferox*."

Major Wardlaw Ramsay says, writing of Afghanistan:—"The only specimen I obtained was a nestling, still partly in down, brought to me by an Afghan in July at Byan Kheyl, in the Hariab valley."

One egg, said to belong to this species, was brought in (along with one of the parent birds) from Kooloo, where it was found in a large loose nest in a tree on the 10th January. Two other precisely-similar eggs, found in a similar situation on the 1st of March, were obtained (again with one of the old birds) in Bussahir. They ought to be genuine, but I cannot separate them from large boldly-blotched Kites' eggs. They are broad, regular ovals, quite devoid of gloss; strong compact shells, dark green when held up against the light. The ground-colour is dull, slightly greenish or bluish white. Two of the eggs are very boldly and densely blotched, the one about the larger, the other about the lesser end, with deep brownish red, which in places is almost black; the rest of the egg exhibits only a very few small spots. The third egg has a few of the deeply-coloured blotches and spots at the small end, and a number of paler reddish-brown spots, specks, and blotches, scattered chiefly about the large end.

The three eggs vary in length from 2.25 to 2.32 inches, and from 1.78 to 1.8 inch.

### Subfamily AQUILINÆ.

#### *Gypaëtus barbatus* (Linn.)\*. *The Lammergeyer.*

*Gypaëtus barbatus* (Linn.), *Jerd. B. Ind.* i, p. 13; *Hume, Rough Draft N. & E.* no. 7.

The Lammergeyer lays from about the 15th November to the 15th of March, the majority, I think, in January and February. It breeds throughout the Himalayas, and the vast range of hills which under various names divides the Punjab and Sindh from Afghanistan and Khelat.

The nest is commonly placed in almost inaccessible situations, in the face of some bold cliff; a ledge of rock, above which some other ledge projects, is generally chosen.

The only eyries I have been able to inspect were shapeless heaps of sticks, nearly a cartload I should say, strewed on ledges of rock (over a space of some 3 to 5 feet long by 2 or 3 broad), intermingled with rags, huge feathers, and large bones, and plentifully besprinkled with the droppings of the birds.

\* I follow Mr. Sharpe in placing this bird among the Eagles.—ED.

The late Major Cock found more than one nest of this species in the neighbourhood of Dhurumsala, on almost inaccessible ledges of precipices between 150 and 200 feet high. Of one that he visited on the 6th December before any egg had been laid, he remarks :—"The nest had a quantity of old rags and bits of cord about it, and was well lined with flecks of wool quite fresh."

Later, this gentleman sent me the following note :—"I should give this bird from November to the end of March for its breeding-season, as I have observed them pairing in the air in the beginning of March. Another observation I have made is, that all the nests, old ones and new ones, that I am acquainted with, to the number of 15, are placed on precipices facing east and south; not one faces north or west. Vultures and Falcons do not seem to be so particular, as I find their nests placed indiscriminately on cliffs facing north or west. This year I have taken the following eyries :—On the 2nd of January, at Deveenah, near Riloo, in the Dhurumsala district, a nest containing three eggs; a peculiarity here was that there were two nests, placed some 4 feet from each other on the same ledge, both quite new, but only one of them (the nest in which the eggs were) lined with wool. I have frequently visited this place since, as I thought there *might* be two couples, but there were not.

"On the 29th January, a nest with two eggs. On the 10th February, a nest with one egg. I left this latter nest for ten days after this egg was laid, and then (I was afraid it would be hard-set) took it, the old bird being evidently incapable of laying another egg. This egg was a particularly large one, measuring 3·65 by 2·9 inches. After I had taken the egg, the birds came and destroyed their nest, pulling out all the wool it was lined with, and scattering it about. A fourth nest is now (March 7th) ready for eggs, and it was the owners of this nest that I observed pairing, as before mentioned, in March. I will also add my testimony as to this being a most cowardly bird, suffering itself to be driven off by *Gyps himalayensis*, and I have even seen little *Falco atriceps* put it to flight."

On a former occasion he thus described another nest :—"On the 4th December, 1868, I found the nest of *Gypaëtus barbatus* in a hollow on the face of a steep precipice, situated in a range of hills some 6 miles off the Grand Trunk Road, two marches from Rawul-pindee on the Peshawur side. It was a large structure of sticks, and completely filled up the hollow or cave in which it was placed. It was lined with locks of the hair of hill-goats, on which the eggs were placed; there was also one piece of cloth in the nest, some blue cotton stuff, by which I was reminded of this bird's relationship to *Necrophorus*. The eggs were set, I should think, from fifteen to eighteen days."

Mr. R. Thompson writes, that in Kumaon "this species breeds from November to February, late in which latter month the young may sometimes be seen; it selects ledges of precipices at elevations of 5000 feet and upwards. The nest a huge platform, some 4 or 5 feet in diameter, is constructed of small sticks and thick twigs, placed so as to form a footing for the young, and is lined with

pieces of cloth, rags, &c. I have frequently noticed parent birds with only a single young one following them, and I am inclined to think that they seldom rear more."

Captain Hutton tells us:—"These birds are common in the hills, from the Doon to the Snowy Range; it breeds for several seasons together in the same nest, sometimes giving the old nest a few repairs. The spots selected at Mussoorie are of the most dangerous description, and often perfectly inaccessible; while even in the least dangerous spots a man must be lowered down over the rock by a stout rope to ascertain if there are either eggs or young ones in the nest; since the latter being generally placed in a wide fissure in the perpendicular face of the cliff, it is not visible from above."

"One nest was found on the 30th March, and a boy was lowered down over the rock, but he found that the cleft and nest of two years previously had been abandoned, and a new nest had been made in another cleft lower down, in which was a young bird partially fledged. Not being prepared to rob the nest at that time, the nestling was left, especially as the old birds were near, and their movements somewhat threatening. On the following morning, the lad was again persuaded to descend, and as the old birds were absent he secured his prize. The nest was built on a ledge of rock within a cleft, and was composed of a thick bed of sticks, lined with grass, old rags, bones, and what appeared to have been a portion of a sheet. There was nothing in the shape of food, except part of the wing of some large bird.

"During the present year (1869) a nest was prepared in the very same spot, and was finished on the 24th February; on the 10th March it was visited, the old birds being at hand, but no eggs were found. It was visited again once after this, and found to be deserted. Towards the end of March another nest was visited, but it had been blown off the rock in a gale of wind."

It seems probable that two is the number of eggs most commonly laid, and that three may, not very unfrequently, be found.

Lieut. H. E. Barnes tells us that this Vulture is common on the Khoja Amran Range in Afghanistan, where it breeds.

The eggs, of which I have now seen more than a dozen, vary much in shape, colour, and size; but typically they are rather broad ovals, somewhat pointed towards one end. As regards colour, I have now seen every variety of *Neophron*'s eggs reproduced in those of this species.

The texture of all the eggs I have is rather coarse, but the shells are more compact and less chalky than those of the *Neophron*.

The colour of the shell, when held up against the light, is pale dingy yellow, as in *Neophron*, hereby further exhibiting the close affinities of these two species, and separating them from the true Vultures, all of whose shells, when seen against the light, are, to the best of my belief, a more or less dark sea-green.

None of the eggs had the slightest gloss. Of the first two I examined, both had a nearly uniform pale salmon-buff ground, here and there mottled paler. One was devoid of all markings:

the other was somewhat thinly blotched, clouded, and spotted in all parts with pale reddish brown, not much darker than the ground-colour.

One, a magnificent specimen from Kumaon, was like a full-coloured Falcon's egg. Some were a deep orange-brown; another was dull white, thickly spotted, blotched, and streaked with pale, washed-out reddish brown and purple, the markings quite confluent on the large end, where they form a pale irregular mottled cap.

The two eggs from the second nest taken by Major Cock (now in Mr. Brooks's collection) are, says the latter gentleman, "exactly of the colour you describe (Rough Notes, p. 37): one pale yellow-brown, almost uniform, the spots are so small; the other with a few larger and darker spots now and then. They are what I call poor-looking eggs, and not nearly so fine as the European ones in Hancock's collection."

The huge solitary egg from Major Cock's third nest was a deep red-brown, streaked in places with lighter brown.

We may now say that the eggs of this species vary from 2.96 to 3.65 inches in length, and from 2.5 to 2.9 inches in breadth; and that the average of thirteen eggs measured is 3.24 by 2.66 inches.

*Aquila chrysaëtus* (Linn.). *The Golden Eagle.*

*Aquila chrysaëtos* (Linn.), *Jerd. B. Ind.* i, p. 55; *Hume, Rough Draft N. & E.* no. 26.

The Golden Eagle occurs and breeds sparingly in the Himalayas, from Sikkim to Afghanistan; in the eastern and central portion of this tract it is confined to the immediate neighbourhood of the Snowy Range, but in the extreme north-west it comes nearer down towards the plains. Mr. Frederic Wilson, well known as 'Mountaineer,' writing of the country about Gungootree and Jumnootree, tells me that it "inhabits the hills jutting out from the snowy ranges, and often soars over the latter and up their remote valleys. It is never seen on the lower ranges. It does not go *into* the dense forests, but may be seen sailing above them and along hill-sides that are entirely bare or only studded with a few trees here and there. A pair are generally seen together. They feed on Pigeons, Moonals, and more especially on the Snow Pheasants, on the young of Tahr and Burhel, and will kill adult Musk-Deer. I have several times seen them do this. The nest I have not seen, except on a precipice, which was quite inaccessible."

On the other hand, at Thundiana, a hill some 9000 feet high, overlooking the Agrore valley, on the borders of Hazara, Captain Unwin found a nest and secured a young one thence, along with the female bird, which he sent me. He says:—"The nest was placed on a deodar tree, overhanging a steep precipice. It was about 25 feet from the ground, and was composed of a vast number of dried sticks and branches, collected from the neighbouring pine trees. These were piled up against the trunk of the tree to a height of about 6 feet, and formed a platform of almost 3 feet in

width ; it was lined or littered with dry grass and roots. Some Goojurs, who live near the steep ravine where we found the nest, stated that this pair of Eagles had bred in this same nest for the past three years, and that they occasionally carried off small lambs and kids from their huts."

The eggs of the Golden Eagle are, we know from European examples, very variable both in shape and in colouring, but typically they are very broad oval eggs, only slightly more obtuse at one end than the other.

In colour they vary from dull greenish white or white, absolutely unspotted, to a richly blotched surface, on which but little of the white ground-colour is visible amidst the massive red and brownish-red or reddish-pink blotches, smears, streaks, and spots.

The only two eggs that I possess, taken in India, which I owe to Mr. Frederic Wilson, are the one of the Brahminy Kite's egg type, dirty white, very sparsely scratched and speckled with dirty slightly reddish brown ; and the other of the *Spilornis cheela* type, white, pretty thickly spotted and smeared all over with umber-brown, which may have been redder when the egg was first taken. Both are entirely devoid of gloss, but while in one the shell is comparatively smooth and close-textured, in the other it is singularly coarse and rough. They measure 3·1 by 2·4 inches and 3 by 2·35.

*Aquila bifasciata*, J. E. Gray. *The Steppe-Eagle.*

*Aquila imperialis* (*Bechst.*), *Jerd. B. Ind.* i, p. 57.

*Aquila mogilnik*, *Gm.*, *Hume, Rough Draft N. & E.* no. 27.

The Steppe-Eagle breeds but sparingly in the Himalayas, from Nepal westwards, and still more exceptionally in the plains of the North-west. The vast majority of the multitudes of this species that during the cold season throng the well-wooded and cultivated portions of the plains of continental India, go further north and west to breed.

I have myself only found them breeding in the Upper Punjab, and there only on three occasions. They lay (in the plains) in February and March, and possibly April ; building a large stick platform on or near the tops of trees—peepul-trees in all the instances in which I found the nest ; but also at times, like the Tawny Eagle, on babool and other thorny trees. The nests that I saw were from 2 to 2·5 feet in diameter, some 6 to 8 inches thick, composed of rather small sticks and lined with a few green leaves. One nest contained two hard-set, another three fresh eggs, and the third only one ; but from accounts received from Mr. W. Blewitt and others, two appears the normal number.

Mr. Blewitt took a nest of this species near Hansie, in the Dhana Beer (a sort of preserved wilderness), on the 22nd February, 1868. The female, shot on the nest, was sent to me—an old, unmistakable, black Eagle, with conspicuous white scapular patches, and yellowish head and nape. Mr. Blewitt describes the nest as very dense and

compact, 7 inches thick, by 18 only in diameter; composed entirely of keekur (*Acacia arabica*) twigs and without *lining*. The nest was placed, like that of *A. vindhiana*, on the top of a keekur-tree, some 18 feet from the ground, and contained two fresh eggs.

The eggs of this Eagle vary much in size and shape. I have one nearly as large as any one of the Golden Eagle's figured by Hewitson, but most of them are little, if anything, above the size of an average *A. vindhiana*.

They have the usual pale greyish-white ground, unspotted in most; faintly spotted and streaked with very pale brown in others; and in one richly blotched with purplish brown. They seem normally of a somewhat broad oval, but one or two are a good deal lengthened; and one, which I took early in February (a solitary egg in a huge nest), is absolutely pyriform. Placing together specimens of the eggs of the various Eagles, I am unable, as far as texture goes, to point out any certain difference. There is scarcely any gloss on any of the eggs of these various species; but on a few of those of *A. vindhiana* there is a slight trace of this.

In size the eggs vary from 2·6 to 3 inches in length, and from 1·95 to 2·15 inches in breadth; but the average of nine eggs measured was 2·7 by 2·09 inches.

*Aquila vindhiana*, Franklin. *The Indian Tawny Eagle.*

*Aquila fulvescens*, Gray, *Jerd. B. Ind.* i, p. 60.

*Aquila vindhiana*, Frankl., *Hume, Rough Draft N. & E.* no. 29.

The Indian Tawny Eagle breeds throughout the drier portions of Continental India. Here and there this species and the Spotted Eagle may be found breeding in close proximity; but this is only on the borders of their respective territories, and as a rule it is just in those well-drained, open, dry districts, where *A. clanga* never breeds, that the Tawny Eagle most delights to rear its young.

In different parts of Upper India it lays from the middle of November to the middle of June; but the great majority, I think, lay in January. Out of one hundred and fifty-nine eggs, of which I have a record, eighty-three were taken in January, thirty-eight in December, twenty-eight in February, the rest in November, March, April, and June. Only one in this latter month, and none at all in May. The very hot dry weather puts a stop to the laying of most species belonging to the raptorial and insessorial groups. The nest is always, as far as my experience goes, placed on trees. I have never met with one placed on rocky ledges, although I have found them on trees at the foot of, or near to, precipices, which contained apparently most "eligible sites."

They build a large flat nest of sticks, between 2 and 3½ feet in diameter, and from 4 inches to 1 foot in thickness, according to situation. The nests are generally lined with green leaves, sometimes with straw or grass intermingled with a few feathers, and

sometimes have no lining at all. They are generally placed at the very top of the tree, and though I have found them occasionally on peepul and tamarind trees, the great majority were on moderate-sized, but dense babool-trees, standing apart in the midst of fields or low jungles.

Mr. William Blewitt remarks that he found great numbers of the nests of this bird in the neighbourhood of Hansie during January, February, March, and April, 1868. None contained more than two eggs, and many of these latter were considerably incubated. The nests were without exception in *dense* keekur-trees (*Acacia arabica*), at heights of from 16 to 24 feet from the ground. The nests, sometimes loosely and at others densely constructed, were composed of twigs and small branches of keekur, ber (*Z. jujuba*), and similar thorny trees; more than one had a thin lining of grass or leaves, but the majority had no lining. In diameter (excluding straggling ends) the nests varied from 16 inches to nearly 2 feet, and in depth from barely 4 to nearly 9 inches.

During the latter part of 1868 great scarcity prevailed in Hansie and the whole neighbouring country, owing to the failure of the rains. Fodder, especially, was unprocurable, and throughout vast tracts all the babool, ber, and peepul trees were entirely denuded of their foliage, in order to feed the cattle. The result was that *A. vindhiana* entirely deserted the neighbourhood, and where in 1868 with but little trouble Mr. Blewitt met with *scores* of nests, he during 1869 only succeeded in finding two.

My friend, Colonel G. F. L. Marshall, writing of this species, says:—"Very common in the Saharunpoor district. Is said to catch fish by all the natives; but I do not believe it. The native name is Machopa or Machoka. It builds on trees a nest of sticks, and lays two white eggs, sometimes pure, sometimes blotched with dusky and brownish. It commences building in the end of March, but the eggs are not laid till the end of May; and I have taken fresh eggs up to the middle of June, and at Shamlee, in the Mozuf-fernugger district, I took five nests early in June, all with fresh eggs."

"In the Central Provinces," writes Mr. R. Thompson, "this is a common bird in the upland forests. It lays here in November and December."

Most birds, when they have eggs, even before they begin to sit, watch their nests closely. I have, however, repeatedly found nests of this Eagle, containing one or more eggs, with no parent bird anywhere near. I have several notes of this. I quote one:—

"On the Western Jumna Canal, near Hissar, on the 15th December, I found a large nest on the top of a babool-tree. The nest seemed rather fresh, and therefore, though there was no bird near, I sent up a man to examine it. It proved to contain two large eggs. Whilst the man was near the nest, no bird made its appearance; only after we had waited about a quarter of an hour, a large *A. vindhiana* in dark plumage soared slowly past, at a great height overhead. This was about 2 o'clock in the afternoon. We did not

touch the eggs, called the man down, and withdrew to watch the nest ; hiding ourselves carefully some little distance off. It was not till the sun was setting that this same *A. vindhiana* suddenly made its appearance, and descended to the nest, where it was shot. It was a female, and from first to last we saw nothing of the male."

Colonel E. A. Butler writes :—" The Tawny Eagle breeds in the neighbourhood of Deesa, principally in the months of January and February.

" I also found it breeding in Sind and have the following note on the subject :—Sukkur, 3rd February, 1879, two slightly incubated eggs. The nest, which was of the usual stick type, but not very large, was placed at the very top of a low rundee-tree in a grass ' Beerh ' resting on the low outside twigs about 20 feet from the ground and commanding a good view of the surrounding country. The old birds hung about the spot for several days after the eggs were taken, and I saw the hen bird sitting on the nest constantly during that time, but she did not lay again."

Messrs. Davidson and Wenden, writing from the Deccan, say :— " Extremely abundant. Eggs taken from 28th October to 12th February. Some single eggs were set. One nest had three, but the majority only two eggs. An Eagle's egg, almost certain to be that of this species, was brought to D. on the 30th September."

The late Mr. A. Anderson contributed the following account of this Eagle to the P. Z. S. :—" I examined several nests during the season, and invariably found only two eggs (I have since taken three eggs, but this is an unusual number). They vary considerably in size, shape, and coloration ; but on the whole they are poorly marked. January and February is the most general time for this Eagle to lay ; but I came across some nests early in November. These birds had evidently built too soon, and used to sit mopingly close to their nest or on a neighbouring tree, as if watching their homestead, patiently waiting their appointed time.

" The Wokab is partial to certain trees for the site of its nest ; but I have found its predilection in this respect to be regulated by the abundance or scarcity of the trees in question. In the Cawnpore district they almost invariably build on solitary peepul-trees (*Ficus religiosa*). In the Futtehgurh and Mynpoory districts, where the seesoo (*Dalbergia seesoo*) grows to so gigantic a size, the preference is apparently given to them. Higher up the Doab, where the country assumes somewhat of a desert character, I found them building on thorny acacias. On one occasion I found a nest on a babool, which was certainly not more than fifteen feet high—a mere apology for a tree.

" In November, 1867, I got a pair of abnormally small eggs, without the faintest indication of any colouring-matter (the contents of an unusually small nest, which was situated at the very top of a perpendicular branch of a mango), shooting one of the parent birds. This tree was one of a straggling group, close to the Martinière College at Lucknow ; and, in proof of the boldness of this Eagle, I may mention that an enormous camp was formed under

these very trees, awaiting the triumphal entry of the Viceroy into the capital of Oudh. I have since thought that this nest belonged *rightfully* either to *Milvus govinda* or *Haliastur indus*, both of which species were very abundant there. When encamped at the pretty little station of Mynpoory in January last, a pair of Wokabs became excessively troublesome, carrying off everything they could find and robbing the more legitimate camp-scavengers, Kites and Crows, of every morsel they picked up. I was not long in finding their nest, an enormous structure, on the topmost branches of a seesoo, which was visible nearly a mile off, as at this season of the year the tree was devoid of *every green leaf*.

“ The nest contained two half-grown Eaglets, which were most tenderly nurtured by their parents, judging from the frequency of their visits and the pugnacious way in which they attacked every bird that unconsciously approached within sight, no matter how far off.

“ During one of my visits to the tree, I saw both the birds in hot pursuit of a Jugger Falcon that was flying away with a pigeon. Another day I wounded a *Poliornis teesa*, which flew away dangling both legs. Simultaneously with my shot out flew one of these Wokabs, and pursued the wounded Buzzard, in the vain hope of becoming possessed of its prey ! The Eagle very soon overtook the unfortunate bird, flying round it several times by way of inspection, and when satisfied that no booty was forthcoming, it returned to the nest after two or three rapid gyrations.”

Mr. Benjamin Aitken sends me the following notes :—“ These notes were all made at Akola in Berar. 1st January, 1871. Nest on the very top of a small tamarind-tree in a garden : contained one half-fledged bird and a *dead cat*.—19th January. The same pair of birds began a nest in a tree, not a tamarind, in the same garden.—3rd February. To-day I sent a man up ; he frightened off the old bird out of the nest (now complete) and slightly disarranged the nest, but found nothing.—10th February. Sent up a man again, and got one egg.”

The normal number of eggs seems to be two, but it is by no means uncommon to find three. The eggs of this species appear to me to vary prodigiously in size and shape ; but it is not improbable that this excessive apparent variation is due to the enormous series I have before me. I have taken more than a hundred of this bird’s eggs myself, and from first to last have had more than double this number sent me by other observers. Normally this bird’s egg is a somewhat broad oval, slightly pointed towards one end, some are very long and pointed. A pair which I took in the Goorgaon district are long and narrow ; the cubic contents of these must be fully twice that of some of the smaller specimens ; they each contained a fully developed chick, ready to hatch off. A few of the eggs are nearly spherical, but the broad oval greatly predominates. The ground-colour of the eggs is the usual greyish white, unspotted in about half the specimens, and exhibiting more or less conspicuous markings in others. Of the markings, the

most common are a few large blotches and splashes of yellowish brown, accompanied by pretty numerous specks or spots of the same colour, distributed pretty evenly over the whole egg. In some, the blotches are more extensive and numerous, and exhibit a tendency to cluster towards one end more than the other, and the colour becomes a reddish brown, or in some a purplish brown, while in others all three colours are mingled. In no egg that I possess is more than one-third of the surface covered with markings, and, as a rule, even the richest coloured eggs (and these are comparatively rare) have not above a seventh or eighth of the surface of the egg covered with markings.

Elsewhere I have remarked:—"The eggs vary extraordinarily both in size and shape from a very long oval, much pointed at one end, to almost a sphere; but the ordinary type is a rather broad oval, slightly narrower at one end. In colour, they are most commonly white, with a *very* faint tinge of bluish green; but many of them are more or less streaked, spotted, or blotched with different shades of brown or reddish brown, and occasionally purple of varying intensity, and here and there one may be found richly marked with sharply defined spots and blotches of bright, though slightly brownish, red. Many of the eggs, when taken from the nest, have a faint gloss on them; but they lose this by washing, and the eggs become so soiled during incubation that it usually *is* necessary to wash them. The texture is generally close and compact; the egg-lining is a pure sea-green."

In size the eggs vary from 2·35 to 3·25 inches in length, and from 1·8 to 2·25 inches in breadth; but the average of one hundred and fifty-nine eggs measured was 2·63 by 2·11 inches.

### *Aquila hastata* (Less.). *The Long-legged Eagle.*

*Aquila hastata* (Less.), *Jerd. B. Ind.* i, p. 62; *Hume, Rough Draft N. & E.* no. 30.

The Long-legged Eagle appears to breed in many parts of continental India. I know of its breeding in the Raipoor and Sumbulpoor districts, in the neighbourhood of Calcutta, in Dacca, and again in the extreme north-west, in the Agrore Valley. Here it was, not far from Abbotabad, that Captain Unwin, of the 25th Goorkhas, found two nests on the 29th of April and the 6th of May, the one containing two, the other a single egg; all of which, together with three of the parent birds, he kindly sent me. Of one of the nests he writes as follows:—

"The nest was found on the 6th of May, placed on a cheer or fir tree, in a fork about 30 feet from the ground, and the old bird was shot as she sat alongside the nest. The tree was situated on a sloping hill-side, rather detached from the forests. The nest was constructed of sticks, large towards the exterior and smaller towards the interior of the nest. It was about 18 or 20 inches thick, and  $2\frac{1}{2}$  feet broad, with a depression of about 3 inches deep in the

centre. It contained a single, fresh, large, dead white egg, spotted here and there with deep reddish brown, and with a few very pale pinkish spots sparsely scattered over the shell. The Goorkhas' name for this bird is *Kaka-Kool*; they declare it to be a snake-eater, but the female above alluded to had nothing in the stomach but a couple of rats, which appeared to have been recently swallowed."

Major C. T. Bingham writes:—"On the 14th May I found a nest of this Eagle placed on an immense babool-tree on the banks of the Nezzufgurh Escape canal, where it passes through a number of gardens under the ridge at Delhi. As I got underneath the tree the bird glided off, so after examining the nest, which was a large rough platform of sticks containing two eggs, I hid myself close by and watched for the return of the bird, which happened in about three-quarters of an hour, and as soon as she was seated I moved out and shot her as she went off. The eggs were perfectly fresh, dirty white in colour, with a few scattered lilac spots faint and washed out. They measure respectively 2·41 inches and 2·22 inches by 1·95 inch and 1·82 inch."

Mr. J. C. Parker sends me the following note:—"I had the good fortune to secure another egg of this species on the 9th May, 1877, and from the top of the same mahogany tree in the Botanical Gardens as that from which I took an egg on the 2nd May, 1875, but the nest was not on the same branch, being near the summit of the second great limb of the tree, a good 80 feet from the ground. I experienced the same difficulty in securing this egg as on the last occasion, the tree being a very dangerous one to climb. As both birds were shot in 1875, it is a singular fact that another pair of this rather rare species should have selected the same tree to build on; perhaps the birds of 1875 were the young of the present pair, as they were very light coloured, whereas the only one seen this year was very nearly black on the back."

Mr. J. R. Cripps, writing from Furreedpore in Eastern Bengal, says:—"On the 1st of April I saw a bird fly up into a tamarind-tree with a twig in its mouth, and on the 16th May I took the only egg there was. This tamarind-tree formed one of a clump growing on a deserted 'ryot's bheeta.' The trees were all very large, and the undergrowth of cane, &c., was very dense. The nest was a large structure of sticks and twigs, with a lining of the latter, and contained only one egg. The chick's bill protruded while carrying it home. The nest was about 50 feet from the ground and right on the top of the tree. The parent bird sat very close, taking ever so many stones to drive her off the nest when I shot her. On two adjoining trees I found the nests of *B. coromandus* and *S. rutherfordi*. These Eagles are very tame, allowing of an easy approach at all times. On no occasion did I see them catch birds for food. They perch on the trees that are studded about the expanse of paddy-fields during the day, and retire for the night to the tree-jungle."

Three eggs sent by Captain Unwin seem scarcely distinguishable from those of *A. vindhiana*, though possibly they may on the whole

be somewhat broader and more frequently spotted and blotched. One is absolutely devoid of markings, the second is *very* thinly spotted all over with yellowish brown and very pale purple, and towards the large end there are two or three large reddish-brown smears; the third egg is profusely blotched about the large end with reddish brown, and has two or three large blotches of the same colour on another part of the egg. The ground-colour in all is a kind of greyish white, and the shell is entirely devoid of gloss. In length these eggs vary from 2·4 to 2·55 inches, and in breadth from 1·95 to 2·1 inches.

As in the case of all Eagles, the eggs vary a great deal in size and in the amount of markings.

An egg taken on the 14th of May near Delhi by Major Bingham, of which the parents were satisfactorily identified, has no markings, except a number of very dull pale brownish subsurface-looking clouds and spots, and a couple of great pale dirty brown smears. Another egg, taken from a nest in the Botanical Gardens, Calcutta, measures 2·5 inches in length by 1·97 in breadth, and is profusely streaked and smeared and smudgily blotched with pale dingy brownish red, the markings being almost confluent in a large cap near the broader end.

An egg of *Aquila hastata*, taken by Mr. Cripps, seems to have been pure white and devoid of all natural markings, but in process of incubation it has been everywhere so stained and soiled that faint markings might escape attention. It measured 2·6 inches by 1·95 \*.

### *Aquila clanga*, Pall. *The Spotted Eagle.*

*Aquila nævia* (Gm.), *Jerd. B. Ind.* i, p. 59; *Hume, Rough Draft N. & E.* no. 28.

The Spotted Eagle breeds from April to June in suitable situations throughout Central and Northern India. Occasionally a nest *may* be met with, like one I found near Jodhpur, in comparatively arid districts, but almost without exception their breeding-haunts are well-watered tracts, where perennial canals, rivers, lakes, or swamps furnish an abundant supply of frogs, the favourite food of the young. Generally these tracts are well wooded, as well as well watered; but this species breeds plentifully, I am assured, in Sind, which can nowhere, even in the neighbourhood of the large broads, which the Spotted Eagle so affects, be termed well wooded.

In the Sub-Himalayan tract, from Sikhim to the Jumna, numbers of the Spotted Eagle breed, as they do also in Raipoor and the Tributary Mehals along the banks of the Mahanuddy and its

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\* An interesting account of the nesting of this Eagle by the late Mr. A. Anderson will be found in the 'Ibis' for 1875, p. 199. It is too long to be inserted here.—ED.

affluents, and along the larger streams which drain the jungly portions of the Mundlah and Balaghat districts; on one of these latter streams Mr. R. Thompson found a nest in May, built on the top of a large sâl tree, and took thence a young bird, which he long kept in confinement.

On the 17th May I found a nest containing two eggs, just on the point of hatching, on a huge *Terminalia* tree, in the Sikhim Terai, a few miles from Silligoree. The nest was a mere circular pad of sticks, some 2 feet by 18 inches, and fully 6 inches in depth, with a slight depression towards the centre, strewed over with withered leaves.

My friend Colonel G. F. L. Marshall furnishes me with the following note on the nidification of this species:—"Builds in the Saharunpoor district in the end of May and beginning of June. The nest is commenced about the end of April, and the young are hatched by the middle of June.

"The nest is placed in a fork near the top of a large tree, about 35 or 40 feet from the ground. All that I have found have been in the line of trees along the bank of the Eastern Jumna Canal, on the outside one farthest from the water, and always in sheesum trees. I found four nests, one with young (on the 10th June), and three with eggs on the 22nd of May and 3rd and 11th of June. All the eggs were hard-set. The nest is a large circular platform-like structure of sticks, with a few dead leaves in the egg-receptacle, but no other lining. I noticed no remains of food in any of them. The diameter of the whole nest was about 20 inches, and the interior depth about 2 inches. I have never found more than one egg in any nest. The egg now before me is a perfect, but very blunt oval; of a slightly yellowish-white ground, somewhat profusely spotted and blotched with rather faint yellowish brown, and a pale washed-out purplish brown, which latter colour greatly predominates; the egg is absolutely glossless."

An egg which I owe to Colonel Marshall's kindness is a broad oval in shape, and has a greyish-white ground, richly blotched and spotted with pale purple. This egg has no gloss, and when held up against the light, the shell, as in all those of these Eagles, is a bright sea-green.

Other eggs which I have obtained or seen have been less richly marked, but varied little in size or shape. As a rule, they seem to be more richly marked than those of *A. vindhiana*.

The five eggs that I have measured have varied from 2.5 to 2.8 inches in length, and from 1.94 to 2.2 inches in breadth.

### *Nisaëtus fasciatus* (Vieill.). *Bonelli's Eagle.*

*Nisaëtus bonelli* (Temm.), *Jerd. B. Ind.* i, p. 67.

*Pseudaëtus bonellii* (Temm.), *Hume, Rough Draft N. & E.* no. 33.

Bonelli's Eagle lays in the plains in the latter half of December and in January; but in the Himalayas it sometimes lays, I believe,

as late as April. The nest is usually placed on ledges of precipitous earthen or rocky cliffs, and in the plains I think preferentially in the immediate neighbourhood of some large river or jheel. I have repeatedly seen their nests in the high clay cliffs of the Jumna or Chumbal in the Etawah District, and I found a pair breeding in the ruined and cyclopean walls of the ancient Togluckabad, south of Delhi. Many pairs were breeding in the precipices of the Salt Range near the Mayo Mines when I last visited these, and I found several of their nests in the rocky cliffs overlooking the gorges of the Gaj and the Nurree Nai in the hills dividing Sindh from Kelat.

Occasionally, however, they build on trees; and I found a nest containing a single egg in a large peepul-tree near Bhurtpore.

The nest (as I said before, commonly placed on some convenient ledge or suitable recess in the cliff's face) is very large, from 4 to 6 feet in diameter, and is composed of thickish and moderate-sized sticks, varying from 1·5 to 0·5 inch in diameter. The nest itself varies in thickness from a few inches to a couple of feet, and being always finished off to a level, when placed, as often happens, on a more or less shelving declivity, is much thicker exteriorly than interiorly. In the nests that I have examined branches and twigs of various kinds of thorny acacias were the chief materials used. In no nest that I have seen, not even in that one mentioned as found on a peepul-tree, was there any very perceptible depression in the interior of the nest. In the centre of the platform a circular space, of some 18 inches in diameter, is commonly smoothed over with a thin layer of green twigs; and in the centre of this again a smaller space of perhaps 1 foot in diameter is carefully carpeted with green leaves, those of the neem, peepul, peeloo (*Salvadora persica*), and other trees being apparently indifferently made use of.

Normally, they lay two eggs, but I have once found three in a nest, and on two occasions have known of a single, much-incubated egg being met with.

Elsewhere (in the 'Ibis') I have thus described the taking of a nest of this species:—"About a mile above the confluence of the clear blue waters of the Chumbal and the muddy stream of the Jumna, in a range of bold perpendicular clay cliffs that rise more than 100 feet above the dry-weather level of the former river, I took my first nest of Bonelli's Eagle. In the rainy season water trickling from above had, in a way trickling water often does, worn a deep recess into the face of the cliff, about one third of the way down. Above and below, it had merely broadly grooved the surface, but here, finding a softer bed, I suppose, it had worn in a recess some 5 feet high and 3 feet deep and broad. The bottom of this recess sloped downwards, but the birds, by using branches with large *twiggy* extremities, had built up a level platform that projected some 2 feet beyond the face of the cliff. It was a great mass of sticks, fully half a ton in weight, and on this platform (with only her head visible from where we stood at the water's

edge) an old female Eagle sat in state. This was on Christmas Day! It is not many holidays a working official gets in India, or at least can afford to give himself, and part of mine are generally spent in the open air, gun in hand.

"At the foot of the cliffs is a talus of rough blocks of clay that it will take many a flood yet to amalgamate, and up this I crept until I was only about 60 feet below the nest. Here, however, I could see nothing of the bird. I shouted and kicked the cliff, the men below screamed, threw fragments of kunker (one of which nearly blinded me), and by various signs attempted to indicate to Mrs. Bonelli that a change of locality was desirable. Serenely sublime in the discharge of her maternal duties, that lady took no notice whatsoever of the uproar below; accustomed to the passage of noisy boat-crews, and, like some other sovereigns who sit calmly aloft, unable to realize that it is really against their sacred selves that the mob beneath is howling, the Eagle never moved. Beaten at our first move, we changed our plan. I crept down the talus, and sent up a man to throw down dust and small pieces of earth (we were afraid of breaking the eggs), in the hopes of driving her off the nest. Luckily the very first piece of earth hit her, then came a shower of sand, and concluding I suppose that the cliff was (as it often does) about to fall, she flew off the nest with a rapid swoop. Bang, bang, both barrels, 12-bore, No. 3 green cartridge, full in the chest (as the body showed when we skinned it), and yet with a half fall, like a tumbler pigeon, through some 15 or 20 feet, she recovered herself and swooped away as if unhurt, close along the face of the cliff; 100 yards further I saw a tremor, then in a moment it was clear that she was in the death struggle; she began to sink, and an instant after fell over and over on to a flat block of clay with almost incredible violence. The dust flew up from where she fell, as if a shell had dropt there, but as a specimen the bird was scarcely injured.

"We had hardly secured the female, after the manner of bird-stuffers, plugging nostrils and shot-holes, stuffing throat and smoothing feathers, when we heard a shrill creaking cry, and saw the male coming straight for the nest with a bird (which turned out to be a *Turtur cambayensis*) in his talons. Coming to the nest, the bird seemed surprised to find it empty; it took no notice whatsoever of us, nor did it apparently catch sight of its mate, stretched out with her white breast uppermost on the deck-like platform of our barge, but it straightway settled itself down in the centre of the nest and became entirely invisible. Again tiny stones were thrown down, and after standing up, staring proudly round and stalking to the edge of the platform, where he was hailed with shouts, the male bird flew off slowly, swooping down to within 20 yards of where I sat, and the next moment dropped stone dead with only a loose charge of No. 6 through him.

"He was a much smaller bird than the female. She measured 29 inches in length, nearly 70 in expanse, and weighed close on 6 lbs. He was only 26 in length, 62 in expanse, and about 4 lbs. in weight.

" We had now to get the eggs, if eggs there were, because as yet we could only guess and surmise in regard to these. Just above the recess, the cliff bosomed out with a full swell for some 2 or 3 feet, effectually preventing any one's looking down into the nest from above, or, except by an accidental cannon in the broad groove, such as my boatman had made by a fluke at the very first shot, from even throwing anything down into it. Above the swell the cliff was as nearly perpendicular as might be, and it really did seem as if getting into that nest would be no easy matter. However, some 6 feet east of the nest, passed a sort of fault or crack which traversed the cliff at an angle of about 45 degrees, and down this, a stout rope round the waist, with infinite trouble and no little danger, a way was found after all to the nest. Once there, it was a firm platform of sticks at least 5 feet by  $3\frac{1}{2}$ . In the centre of this a circle of about 20 inches in diameter was smoothed over with fine green twigs of the peeloo, and on this, again, a circle of about a foot in diameter was smoothly spread with the green leathery leaves of the same tree, and on these reposed the coveted treasures, two fresh eggs. One of these eggs was bluish white, blotched and speckled very feebly, but thickly towards the larger end, with *pale* reddish brown. It measured 3 inches in length by 2.19 in breadth. The other was almost pure bluish white, with scarcely any traces of markings anywhere, and measured 2.81 inches in length by 2.13 inches in breadth.

" A few days later, in similar cliffs a few miles higher up, I found another nest. This time, however, the platform was much larger, and was only about 6 feet below the top of the cliff. One could look into it without the slightest difficulty, and a jackal could assuredly have made his way there with ease, as even I got down to it without help and without a rope. The platform of sticks was fully 5 feet in diameter; there was the same smooth patch of twigs and smaller smooth circle of green leaves, this time of the peepul (*Ficus religiosa*), and, as in the former case, on the leaves, about 5 inches apart, lay two fresh eggs. These had a bluish-white ground, blotched all over, but thinly and very feebly, with pale dingy reddish brown; and they measured, the one 2.62 by 2 inches, and the other 2.51 by 2 inches. The eggs were therefore considerably smaller than those above described, while the female, which I shot as she left the nest, was a much younger and smaller one than the magnificent bird first killed."

Captain Hutton, writing from Mussoorie, says:—" *Eutolmaetus bonellii* remains here all the year, breeding in places similar to those selected by *G. barbatus*, but although we have several times found the nest, we never could get at them. It stoops to fowls and is destructive to the larger game-birds."

Mr. R. Thompson has the following note in regard to this species in Kumaon and Gurhwal:—" I have never been up to examine the nests of these birds, because they are always placed on the most inaccessible precipices, but I can vouch for the time of their breeding, viz., from April to June. I had a nest for

several years in view, but never could get at it ; it was on a steep precipice and none would volunteer to assist me. That the birds had their nest there was more than established, because during other periods of the year the pair used to carry off my poultry and eat them wherever they found a place suitable, but in the breeding-season they always carried their plunder to the nest.

"One year I caught the young birds, two in number, the first in July, and the second in August.

"I have subsequently caught young nestling birds at Nynee Tal, along with the old ones, thus taking the whole family. This was in the month of August.

"In February last I saw a pair apparently courting, which flew to and out of a large nest placed in a tree in the forest, at a place called Bunderjewrah, 8 miles east of Ramnuggur."

The late Major Cock sent me the following account of a nest of this species which he obtained near Dhurumsala (in the Himalayas) :—"Found a nest on the 25th January, 1870 ; it was placed in the middle of a cheel-tree (*Pinus longifolia*) on the place where three large branches forked out. This was such an unusual situation that I shot the old bird to be quite sure that it was *Eutolmaetus bonellii*. The cheel-tree stood at the edge of a very lofty precipice, about 40 feet from the bottom of which was a nest of *Gypaetus barbatus*, and there were plenty of likely precipices all about, so I could not understand their building in this tree. The natives informed me that they had done so for years. The nest was a large platform, and the eggs, two in number, were laid on a lining of fresh green cheel-leaves. The eggs were both white, one the usual shape, the other a very long blunt oval. Both eggs were quite fresh, for I watched the nest daily till they were laid."

Colonel E. A. Butler writes :—"Belgaum, Dec. 25, 1879. A nest of Bonelli's Eagle, containing two fresh eggs. The nest was built upon one of the large outer limbs of a tall tree (*Bombax malabaricum*), about 35 feet from the ground, and consisted of a huge mass of sticks lined with the green leaves of the tree it was built upon."

Messrs. Davidson and Wenden, writing from the Deccan, remark :—"A nest with a single young bird just hatched out, was found on 10th February. The hen was shot, and within two days the male appeared with another female and the young one disappeared. The pair went to another old nest of enormous size on an adjacent tree. Although several people were sent to the village officials with instructions to have the eggs taken, nothing was sent to us but two eggs of *N. percnopterus*, which had, of course, been taken from some other nest. Eggs were taken at Kassigaum on 13th January, 1876, slightly set. Other eyries with young birds were seen at Dhotri and Subjar."

Writing from Kotaghery in the Nilghiris, Miss Cockburn says :—"I have been successful in obtaining the eggs of this fine bird, and was present when they were taken. The nest, placed on a

ledge in the face of a precipitous cliff, consisted entirely of a large quantity of small branches of trees which had been the accumulation of years, as the birds invariably return to the same place to build; as a lining to this uncouth nest were added innumerable green leaves. In this same nest I had often had the eggs destroyed by throwing stones into it from the top, and (they played such havoc in my poultry-yard!) several times the young ones had been pushed over the cliff with a long bamboo, in hopes of the parent birds leaving the neighbourhood, which, however, they still continue to frequent.

“The eggs are very large and thick-shelled, of a whitish colour, with a few indistinct light-brown marks, almost entirely confined to the largest end. Notwithstanding every care one egg was knocked against the rock while halfway up, and of course broken. This was unfortunate, as there were only two, this bird never laying more, and sometimes only one. When I reached the cliff the Eagle instantly covered the eggs with leaves, and darted from the nest in a straight line, and after having flown to some distance made two or three wide circles in the air and disappeared. In about half an hour it returned and soared above and beneath me, but never attempted to prevent my depriving it of its eggs. These eggs were taken in the month of December. These Eagles only breed once a year, unless deprived of their eggs or young, in which case they will lay again.”

I have now seen a good many eggs of this species. All I have seen were moderately broad ovals, varying slightly in size and in the comparative length of the minor axis. Some are unspotted, some are more or less faintly blotched, streaked, or spotted with pale yellowish or reddish brown, while others, as Mr. Brooks correctly remarks, “are sparingly blotched and spotted with bright reddish brown, sometimes intermixed with blotches of light reddish grey.”

I have never seen a richly-coloured egg of this species. The ground-colour is that of all Eagles of this type—a pale greyish or bluish white, often becoming, during the course of incubation, much soiled and discoloured.

In size they vary from 2·56 to 3 inches in length, and from 1·93 to 2·22 inches in breadth; but the average of twenty eggs was 2·78 by 2·1.

### *Nisaëtus pennatus* (Gmel.). *The Booted Eagle.*

*Aquila pennata* (Gm.), *Jerd. B. Ind.* i, p. 63.

*Hieraëtus pennatus* (Gm.), *Hume, Rough Draft N. & E.* no. 31.

I have never myself found or seen a nest of the Booted Eagle.

My collector, Mr. Theobald, found a nest of *N. pennatus* on the 21st February, 1869, at Hurroor, in the district of Salem, and from it shot a couple of old brown birds. “The nest,” he says, “was on the branch of a high banyan tree (*Ficus indica*), about 40

or 50 feet from the ground. It consisted of dry twigs, and was in shape a circular platform, with a slight depression in the centre, devoid of lining." The eggs were two in number, only one of which reached me in safety. This one is a very broad oval, almost exactly the same size as the one figured by Mr. Bree. The ground is a dead white, devoid of gloss, and pretty thickly blotched and streaked throughout with reddish brown. The egg reminds one much of some of the richer-coloured eggs of *Milvus govinda*, but the markings are smaller, and the shell, when held up against the light, is a very pale sea-green, much lighter than in any of the numerous specimens of *M. govinda* that I have yet examined. It measures 2·13 by 1·78 inch.

**Neopus malayensis (Reinw.). *The Black Eagle.***

*Neopus malaiensis (Reinw.),* *Jerd. B. Ind.* i, p. 65.

*Heteropus malayensis (Reinw.),* *Hume, Rough Draft N. & E.* no 32.

The eggs that I possess of the Black Eagle were sent me along with the parent birds—one nest containing three eggs, from Bussahir, taken on the 4th of January; the other, from Kooloo, containing a single egg and taken on the 7th of the same month. Both nests were on ledges on the face of cliffs. Independent of other evidence, there is no other bird I believe in these districts that could have laid these eggs. In shape they are broad and nearly perfect ovals, very slightly, if at all, compressed towards one end. The shell is rather coarse and rough, quite devoid of gloss, and when looked into against the light the egg appears of a peculiar light, slightly yellowish green. The eggs of the one nest are greyish white, with only a very few brownish specks and spots towards one or other end; the single egg is richly blotched and mottled all over (most densely towards the small end) with somewhat brownish red, and is one of the handsomest Eagle's eggs I ever saw. Although so different in colouring, the texture of the shell and its peculiar tint when held up against the light is the same in all the four eggs; and coming as they did from different localities and collectors, accompanied in each case by one of the alleged parents, I entertain little doubt of their authenticity. In length they vary from 2·5 to 2·68 inches, and in breadth from 1·88 to 2·02 inches.

**Spizaëtus nepalensis (Hodgs.). *Hodgson's Hawk-Eagle.***

*Limnaëtus nipalensis (Hodgs.),* *Jerd. B. Ind.* i, p. 73.

*Spizaëtus nipalensis (Hodgs.),* *Hume, Rough Draft N. & E.* no. 36.

This species breeds, as far as I yet know, only in the Himalayas, laying from January to the early part of May.

Its nest, a large coarse stick structure, is placed upon some large tree, either hidden in a dense forest, or projecting from the face of some inaccessible cliff.

It lays two eggs, I think, as a rule, but single eggs are often found much incubated.

My friend, Captain Hutton, favoured me with the following notes:—"This species is common at Mussoorie, and occurs also during winter in the Doon; at Mussoorie it is a permanent resident, and most destructive to pigeons, fowls, and game; its loud shrill musical whistle may often be heard far up in the heavens even when the bird itself is lost to sight. It breeds at about 5500 feet of elevation, constructing a thick basket-like nest of twigs and small branches, placed on a lofty tree, often growing out of the fissure of a rock overhanging a precipice, which is apt to turn the head of any but a mountaineer, and to look into which reminds one of the bottomless pit! Nevertheless, we have on more than one occasion contrived to rob the nest. One of these was found on the 5th of March and contained one egg, which was left for the purpose of ascertaining whether the bird would lay another. A few days afterwards, on finding no addition, a man ascended the tree, which was of tolerably easy access, and the old bird making no warlike demonstration, the prize was secured. On attempting to clean it, however, it was found to contain a fully formed young bird. On another occasion, we did not rob a nest so easily. It was found on the 18th March, and contained two eggs, which were left to hatch. On the 1st of April, the nest was again visited and found to contain two young ones covered with a rufous-coloured down; on the 16th April, finding that one young one had fallen from the nest, preparations were made for lowering a man down the precipice to the root of the tree, which leaned ominously out of a cleft in the rock overhanging an awful chasm. On reaching the tree, the man began to ascend, but before he had reached the nest one of the old birds made a dash at him and struck him sharply on the shoulder, causing the blood to flow. Nothing daunted, the man proceeded on his perilous course, under cover of one or two shots from above to scare the old birds away, but without the desired effect, for on the man's arrival at the nest another charge was made by the female, who struck the poor fellow on the head and again caused blood to flow, but luckily the man's greasy linen skull-cap became firmly fixed upon the talons of the bird, which scared her to such a degree that, uttering a loud scream of alarm, she sailed away, rapidly followed by her mate, and the young one was then brought in safety from the nest. It was nearly half fledged, with small slaty-coloured feathers, and grew to maturity in a large roomy cage, when it was set at liberty, and after hanging about the place to be fed for several days, finally took unto itself the wings of the morning and disappeared. These birds sometimes breed in the same nest for two or three years, and apparently only abandon it when it becomes old and rotten, when they select another tree whereon to construct a new habitation at no great distance from the other."

Captain Unwin found two nests of this species in the Agrore Valley: one, placed in a comparatively small cheer tree, was made

of dry sticks lined with a little grass, was about 2 feet wide and was built up with sticks from the fork where its base rested to a height of about  $2\frac{1}{2}$  feet. It contained a single young bird covered with white down, except the back and wings, which were thickly set with short black-brown feathers. The other nest was also placed in a cheer tree, but in a very large one, about 60 feet from the ground. This was on the 6th May. This nest was placed on a fork formed by several branches, was built up of sticks for nearly 3 feet, and was about 3 feet broad. It was lined with fine dried grass, and hollowed out for about 5 or 6 inches in the centre. It contained a single young bird about three or four days old, covered with soft white down.

Although I have, in former years, seen several of its nests, the only specimens that I now possess of the eggs of this species are, *first*, one taken near Mussoorie on the 8th March, which I owe to Captain Hutton. In shape this is a broad regular oval, almost symmetrical at both ends. The shell is coarse, dull and glossless; the ground-colour a slightly greenish white, spotted thinly with reddish brown, and with numerous large blotches and streaks of very pale inky purple. It measures 2.78 by 2.23 inches.

*Secondly*, an egg procured in Bussahir on the 5th January. This is a somewhat smaller egg than the preceding, measuring only 2.6 by 1.9 inch. It is a very perfect oval, has a greenish-white ground, is very sparingly spotted and blotched, almost exclusively towards the smaller end, with somewhat reddish brown, and exhibits traces of two or three large, but very faint, purplish clouds. When held up against the light, the shell is of a peculiarly blackish-green tint.

### Spizaëtus cirrhatus (Gm.). *The Crested Hawk-Eagle.*

*Limnaëtus cristatellus* (Temm.), *Jerd. B. Ind.* i, p. 71.

*Spizaëtus cirrhatus* (Gm.), *Hume, Rough Draft N. & E.* no. 35.

Of this species Mr. R. Thompson remarks:—"The habitat of the Crested Hawk-Eagle is in the uplands of Central India, extending east along the Vindhian Range as far as the southern portion of the Mirzapoor District. How far south of Nagpoor and west of the Puchmurrees it extends I cannot positively say; but here where I write from, the furthest southern corner of the Satpoorahs, it is abundant.

"Its nidification is similar to that of *S. limnaëtus*; it selects a tall tree in some good game locality, builds a huge nest of coarse twigs, and rears, as far as I have yet observed, only a single young one, which is extremely noisy when being fed."

Mr. G. Vidal thus writes of the nidification of this Hawk-Eagle in the South Konkan:—"The Crested Hawk-Eagle breeds in this district from December to April, January being the favourite month. The nests are large and comparatively deep structures, loosely put together with the twigs hanging down untidily. They

are always profusely lined with green mango-leaves. They are built very high up, as a rule, in forks of trees; any large tree serves the purpose. I have found nests in banyan, tamarind, wild fig (*Ficus glomerata*), and bēl trees (*Ægle marmelos*); but the great majority were in mango-trees. The old birds make no attempt to defend their nests. Out of 32 nests examined, none contained more than one egg or one young bird. The average of 25 eggs measured gives a length of 2·63 with a breadth of 2·04. The largest egg measured 3 by 2·1, and the smallest 2·25 by 1·85. In shape they vary greatly, but the usual type is a moderate oval, pointed at the smaller end. The colour is a dull greenish white, sometimes unspotted, and sometimes faintly streaked at the larger end with reddish brown. The texture is comparatively smooth, but devoid of all gloss. The lining is, of course, pale green."

Mr. J. Davidson writes:—"I found many nests of *Spizaëtus cirrhatus*, nearly all with one young one. Vidal says if the nest is looked at it is forsaken. This is not my experience. I found an old nest, round which the birds were flying, in December. I had it examined then and in February without result. I took an egg on the 9th March, *hard-set*. In the beginning of April the birds were still there, and on the 23rd of April I took a second egg slightly-set from the nest, and left the birds on the 29th still clinging to the tree."

Of the smaller race of this Hawk-Eagle which inhabits Ceylon Colonel W. V. Legge writes:—"This Hawk-Eagle breeds in February and March in the forests of the Southern Province of Ceylon, building in the former and hatching its single young one about the middle of the latter month. It selects a tall forest-tree, generally a hora (*Dipterocarpus zeylonica*), and constructs a massive fabric of large sticks in a fork near the top. I have never heard of more than one young bird being reared. I had a fine example brought to me, taken from a nest near Galle, on the 10th of April, 1872, and I reared it without any difficulty."

For a noble series of the eggs of this species I am indebted to Mr. Vidal, who took them in the Southern Konkan, where the species is very common.

In size the eggs vary a good deal, as do those of all these large Raptore. In shape, too, they vary from very round blunt ovals to considerably elongated and decidedly pointed forms, but the majority are rather broad and regular ovals appreciably pointed at the small end. The shell is very strong and glossless, but yet by no means coarse; held up against the light, it is a pale green. They are never perhaps quite unmarked, but they appear to be always poorly marked eggs. The markings vary from an almost imperceptible stippling to a couple of dozen moderate-sized spots and lines, these latter occasionally running into queer-shaped figures like Persian or Arabic writing, but even then they are thin and far from conspicuous. The markings seem always confined to the large end, and are never apparently very bright coloured, but vary from reddish brown to brownish yellow. In length the eggs vary from 2·4 to 2·95 inch, and in breadth from 1·88 to 2·19.

**Spizaëtus limnaëtus (Horsf.). *The Changeable Hawk-Eagle.***Limnaëtus niveus (*Temm.*), *Jerd. B. Ind.* i, p. 70.Spizaëtus caligatus (*Raffl.*), *Hume, Rough Draft N. & E.* no. 34.

I have never yet found a nest of the Changeable Hawk-Eagle.

My friend, Mr. R. Thompson, furnishes me with the following notes:—"The breeding-season commences in March, and lasts until the end of June, but they mostly lay in April and May. The nest is placed, at a height of from 40 to 50 feet from the ground, on large trees in dense woods, usually in a good game locality. The nest is a large round structure from 2·5 to 3 feet in diameter, much resembling that of the common *Aquila clanga*, a thick clumsy platform, composed of thick dry twigs and roots, with a central depression from 4 to 5 inches deep, lined with fine roots and stems. The eggs are usually two, but I have preserved no record of their appearance, and I have no specimens by me to measure or describe."

Mr. J. C. Parker writes:—"On the 15th February, 1874, discovered a nest of this species on a mango-tree, one of a rather scattered group growing in the old mud-forts at Samnuggar on the E. B. Railway, about a mile from the station and close to a cart-track through the forest. Both birds were on the nest, one in the black and the other the spotted state of plumage; the latter was shot and proved to be a male; one egg, quite fresh, was in the nest. The nest itself was small and ragged, and might very well have passed for an old last season's Kite's nest."

Captain Feilden, writing from Thayetmyo, says:—"I have taken a young bird from the nest in the middle of May, and seen several young birds about the end of that month. These birds build the usual Hawk-Eagle's nest in the fork of the largest and most inaccessible tree that they can find, invariably, as far as I know, overhanging the bed of a stream. Either numbers of these birds build and do not lay, or else they desert their nests on the slightest suspicion of their having been discovered. Of half a dozen nests that I saw building in March, on one of which I saw an old female engaged in arranging the sticks, not one ever contained either egg or young bird; though I found a large egg dropped at a short distance from one of the nests, as if the bird had deserted the nest and not built another. Several pairs of birds belonging to nests in more remote parts of the jungle seemed all to have succeeded in rearing one young bird each. The Burmese state that the birds only lay one egg, which is pure white. Fragments of two eggs, one on the ground and another in the nest from which I got the bird, were white."

The egg sent by Mr. Parker, the only one I have seen, is an elongated oval, a good deal compressed towards one end. The shell, though firm and compact, is strongly pitted all over with very conspicuous pores, and hence is rough and entirely glossless. The ground is white with a dull greyish tinge, very faint, and in some

lights rather bluer, in some greener. Within a space of about the size of a rupee or a florin, at the broad end, are numerous excessively minute reddish-brown specks. A very few similar specks are scattered about the rest of the egg, but they are so small and so few and far between that these are not noticed until the egg is closely looked into. It measures 2·9 inches by 1·97.

Mr. J. R. Cripps, writing of the closely allied race which has been named *S. horsfieldi*, says (he writes from Furreedpore in Eastern Bengal) :—“ 23rd May, 1878. Near the factory is a small market-place, in the centre of which a huge burgot-tree rears its head. About 40 feet off the ground, and in the fork of one of the primary branches, this bird’s nest was placed. When first I noticed the parent bird, half her body was visible above the nest, but when she became aware that I was noticing her, she crouched down, and not even her head was visible. I pelted some half a dozen stones, when she flew and settled on a branch close by, and on my knocking her over she uttered a few shrill screams like *S. limnaetus*. I sent a man up and found a callow young which could not have been more than a week old.

“ By the 21st June feathers commenced sprouting on the wings, scapulars and tail, all of a jet-black ; and a week later the feathers of the tarsus appeared ; these were jet-black too. I weighed him on the 10th June, when he scaled 1 lb. 2 $\frac{1}{4}$  oz. He used to eat the flesh of every kind of bird except that of *Hierococcyx*, which he would always throw up. Why was this ? He would not do this with Owl’s and Hawk’s flesh. On the morning of the 30th June I found him dead. The lazy rascal of a servant, to save himself the trouble of feeding it several times, had stuffed its maw so much that the bird must have died of suffocation. I forgot to mention that, in the nest under the chick, were four twigs with green leaves of the jamoon-tree, which had evidently been broken the very morning I found them. The young one was then covered with down of a pale dove-grey.”

### *Circaetus gallicus* (Gmel.). *The Short-toed Eagle.*

*Circaetus gallicus* (Gm.), *Jerd. B. Ind.* i, p. 76 ; *Hume, Rough Draft N. & E.* no. 38.

The Short-toed Eagle lays in the plains of Upper India in January, February, and March, and, according to Mr. R. Thompson, in April and May in the Gurhwal forests.

As a rule its nest is placed on trees, but on two occasions in the Etawah District we have found this species breeding on small platforms, in the face of the high clay cliffs of the Jumna.

In different localities it varies in its choice of trees ; where trees are plentiful, it will build on the topmost boughs of a very tall one, while in bare country, like Hurriana or Western Rajpootana, you will find the nest not halfway up some stunted neem-tree, or scraggy thorny acacia, a mere apology for a tree.

The nest is a large circular stick structure, some 2 or 3 feet in diameter and from 6 inches to a foot in depth, externally very loose and straggling, but composed of rather slighter materials than *A. vindhiana* generally uses, and with a rather deeper internal depression.

Some nests are entirely devoid of lining, rather finer twigs compose the floor of the internal depression and on these the egg reposes. Some nests again have the egg *bedded* in straw and grass, positively as if packed to travel; under some I have found a few green leaves spread, after the fashion of Bonelli's Eagle, and under many a little grass. There appears to be no rule in this matter, season does not affect the question, nor, as far as I can see, locality; in the early part of January and late in March, in the Agra and Sirsa Districts, and in the far west beyond Jodhpoor, I have observed the same diversities in the internal arrangements of the nests.

I have taken a great number of the nests of this species and many of my friends have found them also; but in no instance out of between forty and fifty recorded cases did any of us meet with more than a single egg in the same nest.

When deprived of their egg, the Short-toed Eagles will hang for weeks about their desolated homestead, but apparently they never lay a second time, as many other species do.

Mr. W. Blewitt informs me that he took nine nests of this bird in the neighbourhood of Hansie between the 18th January and the 26th February, and four between the 6th and 26th of March. Some of the eggs were fresh; some more or less incubated; but no nest contained more than a single egg. Eleven of the nests were on keekur (*Acacia arabica*) trees, one on a jhand (*Prosopis spicigera*) tree, and one on a seeshum (*Dalbergia sissoo*). The nests were placed at heights varying from 14 to 22 feet from the ground.

They were composed of twigs of the keekur, kheyr (*Acacia catechu*), and native plum (*Zizyphus jujuba*). They varied in diameter from 14 to 24 inches, excluding straggling ends, and in thickness from 4 to 8 inches. Some were slightly and loosely put together; others were very densely and closely constructed. Most of them appeared to have no lining; but three were thinly lined with straw, two with leaves, and one with fine grass.

Colonel G. F. L. Marshall writes to me:—"Of this bird I have found but one nest. I found it on the 13th of March with one egg, and left it till the 6th April, in hopes that more would be laid, and when I took it at last, it was rather hard-set, so that probably the bird lays but one egg. The nest was in a seeshum-tree, so high up among the smaller branches that I reached it with difficulty; it was made of twigs and so loose in structure that I could see that there was only one egg from below, before I had reached the nest. The egg was well-shaped and pure dull white."

Mr. R. Thompson, writing from Gurhwal, says that the situation of the nest is "usually on the highest branches of a tall tree, in a moderately wooded country, and mostly in one standing by itself."

He adds :—“ Breeds in the Patla Doon, and all along the lower open forests. During the pairing-season, utters a loud and plaintive cry, usually when the pair are mounted high in the air, when they may be observed tumbling about and darting at each other in a most remarkable manner.”

The late Mr. A. Anderson wrote the following note :—“ The eggs of the Short-toed Eagle are seldom procured, owing to their being late breeders—February to April, by which time the camping season is generally over ; and I need hardly observe that eggs of this bird that are collected by the natives are of no value. I have only taken two nests myself during a residence of several years in this part of the country ; and, strange to say, my friend Mr. Bryson was present on both occasions. The first nest above referred to was taken in the Futtehgurh district, and has been described in Mr. Dresser’s magnificent work (‘ Birds of Europe,’ pt. xxix. p. 9) as follows :—‘ On the 10th March last (1873), I was one of a party engaged in doing a little miscellaneous shooting in a belt of Dhâk jungle, when my friend Mr. Bryson drew my attention to an Eagle that had just flown off her nest. The tree selected, if such it can be called, though the tallest in the jungle we were shooting in, was only an overgrown thin sapling, and scarcely strong enough to bear the weight of my climber. The nest contained one egg, and although there was no doubt as to the ownership of it, I was anxious to secure one of the parent birds. We accordingly withdrew the beaters for half an hour to allow her to return, which she did, but again sailed off the nest before we got within a hundred yards. A second and third attempt proved equally unsuccessful, notwithstanding we all (three of us) approached the tree under cover of the brushwood from different directions. Our movements, moreover, were not heard, as owing to a fall of rain that very morning, we could walk about the jungle without making the slightest noise. On my eventually sending up a man to bring down the egg, the Eagle hovered overhead sufficiently close to decide identification, though keeping well out of shooting-range. The nest was small, and in shape, size, and position very similar to that of the Wokab (*Aquila vindhiana*, Franklin) ; but I have never before experienced such wariness on the part of any bird while incubating. Only the other day a pair of Wokabs attacked my climber in the most desperate manner while he was examining their nest, which contained only a pair of tolerably well incubated eggs ; and as to Bonelli’s Eagle, *Lithofalco chiquera*, *Micronisus badius*, &c., &c., they rarely move till the hand is on the nest. The whole jungle was in full blossom, and the nest itself was actually surrounded with clusters of red and black flowers. The egg has an insignificant mean appearance, quite characteristic of the bird itself ; it measures 2·7 by 2·1, and has of course no indication of any colouring matter, but it is a good deal soiled from the green leaves which formed the inner lining of the nest ; the inside membrane of the egg is sap green.’

“ My second nest was also taken in the same kind of scrub, from

the top of a leafless peepul-tree, on the 3rd March last (1875). As is usual at this time of the year, the Dhāk was abundantly in flower, resembling a sheet of flame, the bright orange-red petals contrasting brilliantly against the jet-black velvety calyx.

“There were several old-looking nests on this tree, and from one of them, not much larger than what a Heron would build, protruded what looked like a dry stick, but what Mr. Bryson declared was the tail of some bird that had died while incubating !

“After repeated attempts to induce the supposed bird to fly—some of our missiles actually alighting on the nest—we sent up a man, when off flapped a huge Eagle, displaying her white breast and Owl-like head. The nest was composed of slight babool-twigs, which look very black when dry, and hence our taking it for an old one. It was small, certainly not more than two feet in diameter, with a deep internal depression, so that the bird while incubating could effect perfect concealment.

“The egg, rather a well-shaped one, was a good deal incubated, which naturally accounts for her sitting so close; but it is strange that she never again put in an appearance during the time, some three hours, we remained in the jungle.”

The eggs of this bird are typically broad ovals with a slightly pyriform tendency. They are of a pale, bluish-white colour; bluer than those of any other of our Indian species of Eagle, and are, to judge from a very large series, invariably spotless; moreover, they seldom appear to be discoloured during the process of incubation in the way most other Eagles’ eggs are. In my whole collection only one egg is in any way as small as that figured by Dr. Bree, and more than one are all but as large as the egg of the Bald Eagle figured on the same page. The colour of the shell in this species when held up to the light is a peculiarly bright sap-green, very different from the deep green of *Haliaetus macii*, or the sea-green of *A. vindhiana*. In size they vary from 2·65 to 3·15 inches in length, and from 2·05 to 2·45 inches in breadth, but of twenty-seven eggs measured, the average was 2·9 by 2·3.

### Spilornis cheela (Lath.). *The Crested Serpent-Eagle.*

Spilornis cheela (Daud.), *Jerd. B. Ind.* i, p. 77; *Hume, Rough Draft N. & E.* no. 39.

The Crested Serpent-Eagle, or, as it should perhaps more properly be called, the Indian Harrier-Eagle, breeds throughout the Sub-Himalayan ranges and regions, as far west at any rate as Kangra, at heights of from 1500 to 5500 feet above the sea-level, laying in March, April, and May.

The nest is, I believe, always placed on trees in the immediate vicinity of water, not at the top of the tree, but in some fork, as Major Cock says, “like that of the common Kite.”

It is circular, loosely made of thicker or thinner sticks and twigs, and lined with fresh leaves or fine twigs and roots of grass ; it varies in size from 1·5 to 2 feet in diameter, and from 4 to 8 inches in thickness.

They lay, I should say, usually only one egg, but in the Doon, where they are plentiful, natives assert that they not unfrequently have two young ones, and must therefore, if this be true, occasionally at least lay two eggs.

The late Major Cock sent me the following note in regard to the nidification of this species :—“ I have taken, or rather found, four nests of this species in the neighbourhood of Dhurumsala, at heights of from 4000 to 4200 feet above the sea. The first, which I found on the 3rd of April, contained one semi-incubated egg, and was placed on a mango-tree, one of a clump of four, situated on the banks of a stream in tolerably well-wooded country. The second, found April 8th, contained one hard-set egg, and was also in a mango-tree, one belonging to a small grove, overhanging a tiny stream, in a dark well-shaded situation.

“ The third, found April 11th, contained a perfectly fresh egg ; it was in a thick grove beside which a stream runs, and in which two old nests of this same species were also found.

“ The fourth contained no egg, but on the 19th of April was complete and ready to lay in ; this, too, was in a grove overhanging a stream.

“ The nest is about halfway up the tree, not on the top, but placed, more like the nest of the common Kite, on some fork.

“ It builds a peculiar and not very large nest. The nests are always made of the twigs of the tree on which it is placed, fresh twigs broken off by the bird, and the lining of the nest is of leaves of the same tree. No feathers, mud, or other material are used in the construction of the nest, which is about 1·5 foot across ; the hollow in which the eggs are laid is rather deeper than is usual with birds of this class.”

Captain Hutton sent me the following note :—

“ *Spilornis cheela*. The nest was found on the 10th of March at 5500 feet of elevation ; it was composed of dry sticks and small branches interlaced on a tall tree ; on visiting it again, we found that some mischievous urchin had pulled it to pieces, which they are constantly in the habit of doing. This bird is common both in the Doon and hills, and where a pair take up their quarters, no fowl or pigeon can escape ; I have had a dove-cot cleaned out over and over again by them. They are cunning hunters, one sweeping over the hill-side at no great elevation, while the other takes a higher line, so that let the pigeon ascend or descend, he always finds himself between two fires, and unless he can find shelter in a tree he is sure to be caught, as the pursuers decrease the distance between their lines and meet the victim at the point.”

Mr. Thompson says :—“ This species breeds from April to June, building a coarse circular nest some 2 feet in diameter, composed of thick roots and stems, and lined with finer twigs and grass-

roots. The nest is usually placed on lofty trees, in well-wooded, shady and watered ravines, or in the low Himalayan rice-lands and warmer valleys. I have found the nests of these birds in the lower valleys. They contained one young usually. I have never got the eggs."

Mr. J. C. Parker sends me the following note from Bengal:—  
"One egg from a nest in a peepul-tree, Magra lake, Nuddea. As regards colour this egg so nearly resembles the description given by yourself of a common variety of this species in 'Nests and Eggs,' that I need say no more, and as to the position of the nest in the tree, it exactly corresponded with that given by Major Cock in the same work. The nest as viewed from below seemed a small poor affair, composed of large sticks, and was found to be lined with the fresh leaves of the tree; and when first discovered on 23rd February, I took it to be unfinished, but there did not appear to be anything added to the structure when I secured the egg, which was quite fresh, on the 18th March, shooting the female from the nest."

The first two eggs that I obtained of this species, both of which were taken by Major Cock near Dhurumsala, differed much in appearance. The one, though considerably larger than average specimens, and with a closer and less chalky texture, greatly reminded one of a common type of the eggs of *Neophron ginginianus*; while the other, though of course smaller, in shape and richness of colouring resembled some of the more brilliantly coloured eggs of the Golden Eagle. The first egg had a dingy reddish-white ground, with at the large end a ragged cap of dingy brick-red, mottled with deep blackish blood-red. Beyond the cap, which was of the size of a rupee, streaks, specks and splashes, all having a longitudinal direction and looking much like a dense reddish-brown shower falling from the cap, thickly covered the whole of the rest of the egg, growing less and less dense towards the small end.

The other had a *pure* white ground, and was thickly blotched, mottled, and clouded with the richest blood- and brick-red. The big end, for the space of about a rupee, exhibits no markings but a few specks and spots, and though the rest of the egg is everywhere pretty thickly covered, the markings are most dense at the small end. In shape, the one egg is a nearly perfect ellipse slightly pointed towards the small end, but the other egg is a very broad oval, very obtuse at the large end and scarcely less so at the smaller extremity.

Subsequently I have seen many of these eggs, and I may say generally that they are broad ovals, in some specimens somewhat pyriform, and in many a good deal pointed towards the small end. The texture of the shell is much that of the egg of the common Kite, rather rough and glossless. The ground is bluish or greenish, more rarely reddish white—in some thinly and scantily speckled and spotted with reddish brown and red; in some sparingly clouded and dingily blotched with pale purple or purplish brown; in others with the markings denser and richer, forming at times a

confluent brick-dust red cap at the larger end, mottled with deep red, and the whole of the rest of the surface thickly streaked and speckled and spotted with brownish red and purple.

In length they vary from 2·62 to 2·88 inches, and in breadth from 2·12 to 2·25; but the average of a dozen eggs is 2·78 by 2·2 inches nearly.

**Spilornis melanotis (Jerd.).** *Jerdon's Serpent-Eagle.*

*Spilornis minor*, *Hume*; *Hume, Rough Draft N. & E.* no. 39 bis.  
*Spilornis melanotis (Jerd.)*, *Hume, Cat.* no. 39 bis.

Jerdon's Serpent-Eagle breeds in the neighbourhood of Raipoor, where in May Mr. F. R. Blewitt obtained a nest containing two eggs. He says:—"When the nest was robbed, the female was sitting on the eggs, and the male was perched on a branch near to the nest. The nest was near to the top of a large peepul-tree, between the forks of a branch, overhanging a small stream. The nest was composed of prickly and other twigs, some 20 inches in diameter and 4 or 5 inches in thickness. It was densely lined with green leaves, peepul and mango. These were formed into a pad, some 12 inches in diameter and fully 2 inches thick."

These two eggs are of somewhat the same type, but decidedly smaller and feebler coloured than those of *S. cheela*. They are very regular ovals; the ground a dull white and totally glossless, and the texture of the shell, as in the last species, rather coarse and chalky. The one is rather thinly speckled and spotted all over with very dull dingy brownish red; the other has about half a dozen tiny spots of this colour and a number of very pale washed-out brownish-purple clouds, almost confined to the two ends, large at the large and small at the small end. They both measure 2·68 inches in length and 2·05 and 2 inches in breadth respectively.

Mr. G. Vidal writes from the Southern Konkan:—"The only eggs of this species I have were taken from two nests on the 18th and 20th March. They measure, respectively, 2·75 by 2·25 and 2·65 by 2·22, and are broad white ovals, slightly pointed at the small end, streaked all over with reddish brown, and with a confluent cap of the same shade at the large end."

**Spilornis rutherfordi**, Swinh. *Rutherford's Serpent-Eagle.*

*Spilornis rutherfordi*, *Swinh., Hume, Cat.* no. 39 ter.

Of the nidification of this Serpent-Eagle in Tenasserim, Major Bingham writes:—"Wherever there is a *quin* (*i. e.* marsh) or large patches of wet paddy cultivation, a pair of these Harrier-Eagles are almost certain to be found.

"It is very common in the Thoungyeen valley, where, on the 14th March this year, I revisited a nest I had had marked down for me in February, and took from it a solitary egg, measuring 2·57 by 2·08—in fact rather a broad oval of a dull white ground,

blotched, clouded, and dashed with pale purple and rusty red, the purple forming a dull cap of irregular shape over nearly half the egg at the larger end. The nest, which was placed some 70 feet up a kanyin tree (*Dipterocarpus alatus*), was composed of large branches, laid across in a fork, with a superstructure of small sticks intertwined in a circular form, and the hollow in which the egg reposed lined with very fine twigs; the whole mass may have been some three and a half feet in diameter and one and a half foot thick."

Mr. J. R. Cripps found the nest of this bird at Furreedpore in Eastern Bengal. He says:—"The bird shot on the 1st April was incubating. The nest was on a bael (*Egle marmelos*) tree, and within 4 feet of the outer end of one of the primary branches which grew out perfectly horizontally, and about 15 feet off the ground. She flew off the nest and settled on a bombax tree close by, when I knocked her over; nest of twigs of sizes with a lining of fresh bael-leaves; one very hard-set egg. Found a frog in the gullet of this bird. Their principal food, however, is snakes. One day I watched a bird finishing a snake, two feet long, in five minutes. They commence at the head and go on tearing and swallowing until all is done. They are very fearless birds, allowing me to pass within twenty feet of them when sitting on the ground with snakes in their claws. On one occasion, when out Snipe-shooting, one of these birds stooped at a wounded Snipe but missed it. They are permanent residents. Their cry has a mournful sound, and, although not very loud, can be heard when the bird is flying high overhead."

The egg taken by Major Bingham is a very regular and broad oval, with a rather smooth shell and a white ground with an immense confluent cap of dingy rufous brown, extended as a shower of blotches, smears, and clouds over the whole of the rest of the egg. Here and there the markings have a dull purplish tinge. I have seen *Neophron* eggs not very different in appearance from this one. The egg taken by Mr. Cripps is a regular moderately broad oval, just appreciably pointed towards one end; the shell is dull, coarse, and full of pores and entirely glossless. The ground is greyish white, and it is pretty thickly sprinkled over the upper half of the egg, and more thickly elsewhere, with small irregular patches and blotches of a dull pale yellowish brown. Doubtless very much brighter coloured examples occur. It measures 2·51 by 2.

*Spilornis spilogaster* (Blyth). *The Ceylon Serpent-Eagle.*

*Spilornis spilogaster* (Bl.), *Hume, Cat. no. 39 bis A.*

Of this somewhat doubtful species, Colonel Legge writes in his 'Birds of Ceylon':—"The nest of this Eagle has very seldom been found; and the eggs I have never been able to procure. It breeds in the Western Province in March and April, Mr. MacVicar, of the Ceylon Public Works Department, having received a young bird taken from a nest in the Hewagam Korale in the latter month.

The nest was described to me as being a large structure of sticks placed in the fork of a tree.

"Layard, who was very fortunate in finding the nests of rare birds, remarks that 'it builds in the recesses of the forest on lofty trees. The structure is a mass of sticks piled together and added to year by year. The eggs, generally two in number, are 3 inches in length by 2 in diameter, of a dirty chalk-white, minutely freckled at the obtuse end with black dots.'"

**Butastur teesa** (Frankl.). *The White-eyed Buzzard-Eagle.*

**Poliornis teesa** (Frankl.), *Jerd. B. Ind.* i, p. 92; *Hume, Rough Draft N. & E.* no. 48.

The White-eyed Buzzard-Eagle lays usually in Upper India during April. A few nests may be found during the latter half of March and the early part of May; but these are exceptions.

They prepare their nests, as a rule, some considerable time before they lay; a nest examined, and ultimately taken, in Etawah, was completed twenty-four days before the first egg was laid.

They make their own nests (a new one, as far as my experience goes) each season—never, I believe, appropriating those of other species; but they will, at times, pull these to pieces for materials. The nest is usually placed in a fork pretty high up in some thickish foliaged tree—mangos, in some localities at any rate, being decidedly their favourites. I have found a nest in a solitary tree; but more commonly they choose one of the outer trees of some small clump or grove.

The nest is a loose structure of twigs and sticks, very much like a Crow's, and without any lining. Normally they lay three eggs; but I have once found four, and on several occasions have taken nests containing only two, both fully incubated.

These birds are much attached to their nests, and hang about them for many days after they have been robbed, and at times will lay in them a second time. On the 11th April, 1867, I took a single perfectly fresh egg out of a nest, which a few days before had been cleared by Mr. Brooks.

Mr. W. Theobald makes the following note of this bird's breeding in the neighbourhood of Pind Dadan Khan and Katas in the Salt Range:—"Lays in the second week of April. Eggs, four only; shape varies from ovate pyriform to blunt ovato-pyriform; size, from 1.80 to 1.93 inch in length and 1.50 in breadth; colour, pure greyish or plumbeous white. Nest, small, of twigs, in trees near cultivation."

Colonel G. F. L. Marshall writes from Saharunpoor:—"This bird breeds in May, making a small rudely-constructed nest of twigs and sticks in the fork of a tree about 25 feet from the ground, and without lining of any sort; the eggs are hatched in the beginning of June; they are generally three in number, but I have never seen more than two young ones in a nest."

"In one nest I found a half-fledged young one, another dead with its stomach eaten away, and two live lizards, one of them partially eaten. On March 27th, I noticed one of these birds commencing its nest, and another on the 7th April; the latter nest I took on the 10th May, and it then had three hard-set eggs." On another occasion, he says:—"This species is very common in these parts; it builds in the forks of trees, generally sheeshum or khirna, a very rude and small nest of twigs. I have noticed this bird pulling to pieces a nest of a Pied Starling, but I imagine it was only to get the materials, as the nest was empty at the time."

Writing from Sambhur, Mr. R. M. Adam says:—"The White-eyed Buzzard is pretty common here. I took a nest with two eggs on the 29th April, 1870; but they must lay much earlier than this, as I saw a pair making love on the top of one of the salt heaps on the 26th September, 1870. In Oudh I obtained a nest on the 30th April, which contained three fresh eggs."

Major Bingham writes:—"The White-eyed Buzzard breeds at Allahabad from the end of February to the middle of May. The nest is very loose and straggling, made of thin branches and unlined. Two, I think, is the usual number of eggs laid, but I have taken three."

"The birds nest I think invariably in trees; and it is not a hard nest to find, for when there are eggs in it the female keeps uttering a curious mewing cry, beginning at daybreak and lasting with intervals of rest through the day; at least, such was the custom of one that built in my compound."

Writing from Deesa, Colonel Butler says:—"I found a White-eyed Buzzard sitting on a small stick-nest near Deesa on the 29th March, 1876. The nest was very small for the size of the bird, and built near the top of a neem-tree growing in a hedge surrounding a yard near the Cavalry Lines. Both parents sat on a tree close by, squealing all the time the nest was being robbed. Another nest in a wood near Deesa, 16th April, 1876, contained one fresh egg. The nest was similar to the one described above, but in the fork of a tree and only about 12 feet from the ground."

Mr. Scrope Doig, referring to Sind, writes:—"Found nests on 8th and 27th April. My man found the nest on the 8th April, and shot the bird (male) before he took the eggs. The nest of 27th I found myself, and owing to the pugnacity of the birds, who continually stooped at the man who was climbing the tree, I was obliged to shoot one of the old birds. The nest was situated on the bank of the Narra, in a babool tree about 20 feet from the ground. Eggs in both nests three in number."

The late Mr. A. Anderson sent me the following interesting notes:—

"The nidification and eggs of the White-eyed Buzzard are so well known that I shall confine my remarks on this subject to describing three clutches of *marked* eggs which I have recently acquired, as these abnormally coloured varieties are, I believe, unique in the collection of ornithologists.

“ Elsewhere I have thus described the first set above alluded to :—‘ This Buzzard, as is well known, lays absolutely colourless eggs of the Goshawk type ; the occurrence, therefore, of a clutch of coloured eggs will doubtless prove interesting to oologists. One of these eggs is *very well* marked with *reddish-brown blotches* at the obtuse end, covering nearly half the surface of the egg ; the second is faintly marked with light greyish-brown spots at the small end, somewhat in the form of a zone ; and the third has still fainter indications of colouring-matter at the same end.’

“ During the past spring I have been so fortunate as to obtain two pairs of even better coloured eggs than those above alluded to. These I will endeavour to describe as follows :—

“ (i.) Nest of two eggs, Futtehgurh, 5th April, 1875. These are somewhat undersized ; in shape of a broad oval, and freely marked with *reddish-brown* specks at the obtuse end. In one specimen the markings extend, more or less, all over the surface of the egg.

“ (ii.) Nest of two eggs, Futtehgurh, 27th April, 1875. A full-sized pair ; one is a broad oval, the other somewhat pyriform. The former has a few russet-brown *blotches* at one end only, one of the marks being about the size of a large pea. The colouring-matter in the companion egg is confined to the compressed end, covering about a fifth of the surface, and consists of delicate russet-brown *veined* or *map-like* markings which are so characteristic of the *Bunting group*.

“ In the coloured eggs of this species we have a very good illustration of the importance of oology as an element in the classification of birds, clearly showing that *Poliornis* forms as it were the connecting-link between the genera *Buteo* and *Circus*.

“ If I were to arrange the above series of coloured eggs in my collection, according to their appearance, I should assign to them a place between the eggs of *Haliastur indus* and *Elanus melanopterus*.”

Mr. Benjamin Aitken remarks :—“ In either April or May 1870 I obtained three eggs from a nest in a tree in the middle of a mango-tope at Akola, Berar. The parent birds at once took possession of an old nest, either a Crow’s or a Hawk’s, perhaps their own of a former year, and laid three more eggs, one of which was taken. The former two were hatched in due time, and the young birds left the nest in the end of June.

“ The young of this bird, and also of the Shikra, keep up an incessant screaming for days before and after they leave the nest ; so that you cannot pass within two hundred yards of a brood of nearly fledged or newly fledged birds without being made painfully aware of their existence and good spirits.”

The affinities of this bird, to judge by its eggs *only*, are rather with the Goshawk and the Harriers, than with the Buzzards or the Kites. All the eggs that I have seen are pure greyish or pale bluish white, absolutely without speck or spot ; but occasionally eggs may be found marked as described by Mr. Anderson. In shape they are a broad oval ; but some are slightly pyriform.

Held up against the light, the shell is a sea-green, much of the same hue as that of the eggs of *A. vindhiana*.

The eggs vary from 1.75 to 2.0 inches in length, and from 1.4 to 1.62 in breadth; but the average of thirty-six eggs measured was 1.83 by 1.53 inch.

**Butastur liventer (Temm.). The Grey-breasted Buzzard-Eagle.**

Butastur liventer (Temm.), *Hume, Cat.* no. 48 ter.

The Grey-breasted Buzzard-Eagle breeds throughout Pegu.

Captain Feilden wrote from Thayetmyo:—"I only found it in a long line of paddy-fields, extending many miles inland from Thayetmyo, but much broken by patches of jungle and dotted with large trees standing singly or two or three together in the middle of fields. It breeds in March."

The only nest he took was built on a thin branch of a single high tree surrounded by dry rice-fields. The eggs are very like those of *Butastur teesa*—a pale skim-milk blue, and comparatively glossless, but with a very few tiny, pale brown, and purplish-brown specks. One egg measured 1.85 inch in length by 1.3 in breadth; so that, to judge from this specimen, the eggs of this species are somewhat narrower than those of *B. teesa*.

Subsequently Mr. Oates found two nests of this species further south in Pegu, near the town of Pegu itself. He writes:—

"March 11th.—Nest with two eggs; more would probably have been laid. The nest was in a mango-orchard, in a small tree about 20 feet from the ground. It was composed of small sticks and had no defined shape. Egg-lining green; shell pale greenish white, without gloss. Size of eggs 1.81 by 1.45 and 1.86 by 1.47.

"March 31st.—Nest with two fresh eggs in a medium-sized tree. The eggs are rather smaller than those I took before, measuring 1.73 and 1.75 by 1.45 in breadth. Colour as before."

An egg sent by Mr. Oates is a very broad regular oval, the shell very smooth and compact, but with scarcely any appreciable gloss; when held up against the light a clear dark green. The colour is white, with an extremely faint greenish-grey tinge. A few tiny greenish spots are dotted about the large end of the egg, and as usual the surface of the egg exhibits here and there a few pale yellowish-brown stains.

**Haliaētus leucogaster (Gmel.). The White-bellied Sea-Eagle.**

*Haliaētus leucogaster (Gm.).*, *Jerd. B. Ind.* i, p. 84.

*Cuncuma leucogaster (Gm.).*, *Hume, Rough Draft N. & E.* no. 43.

Mr. H. C. Parker procured an egg of the White-bellied Sea-Eagle on the 28th January, 1861, from a nest in a lofty tree near

the Roopnarin, in the neighbourhood of Diamond Harbour. Both birds were shot, one from the nest. The egg, which was fresh, was nearly pure white, a very regular oval, slightly pointed towards one end, and measured 2·87 by 2·17 inches.

Dr. Jerdon states that "in Pigeon Island, 30 miles or so south of Honore, which is well wooded with large forest trees, a whole colony of these birds have their nests, at least thirty or forty of them, and the ground below their nests is strewed and whitened with bones of sea-snakes chiefly, and also of fish. They breed in December, January, and February."

My friend Mr. H. R. P. Carter has verified this observation through a correspondent, and, I believe, procured eggs thence; but I never received these.

Mr. Davison remarks:—"I found the nest of this bird on the 8th of March on Nancowry (Nicobars). It was a huge mass of sticks placed between two great branches of a large tree, at a height of about 80 feet from the ground. The tree grew on the edge of a small landslip, about 200 feet from the shore. It must have had eggs, as the bird was sitting; but I failed to obtain them. I could not climb the tree myself, and I could get no assistance from the Nicobarese."

The late Mr. De Roëpstorff sent me an egg from Nancowry with the following note:—"The egg was got out of a nest at a little village opposite the Settlement. The nest was in the top of a very high straight tree, and was more than 9 feet across. I shot an Eagle in it which turned out to be a *male*; the female was so shy that she would not get within shot. Egg taken 24th January, 1876."

Mr. G. Vidal writes from the Southern Konkan:—"When once paired these Eagles make the tree on which they have built their nest their permanent head-quarters all the year round, returning to the tree after each foraging trip with great regularity, and using the nest as a larder and a refuse-pit for fish and snake bones and other waste food. Once, when the young birds of the season had long since left the nest, I found a half-eaten fowl in it freshly killed. At night they roost, whether breeding or not, close to the nest. The young are very soon driven off after they are able to shift for themselves.

"They breed in October, November, and December. The earliest egg I have was taken on the 21st October, and the latest, hard-set and just ready to hatch out, on the 16th December. All the nests I have seen, about twelve, have been in trees. They are gigantic platforms, built of strong thick sticks, fully 5 feet in diameter, with a comparatively slight depression in the centre. The same nests are used year after year, a few sticks being added each year by way of repairs. There is a well-known nest on the fork of two horizontal branches of an old banyan tree, overhanging the massive walls of the ruined island-fort of Suvamdurg. I first saw this eyrie in 1869. How ancient it was then I don't know, but ten years later, in October 1879, it had two fresh eggs in it.

At this particular place the old birds are very wild and wary, but where, as frequently happens, they build in large trees in the midst of houses and cocoanut-gardens, they become very familiar and are not easily disturbed. Their loud, clangling note, when close overhead, is almost deafening, and is audible a mile or more distant.

"In all the nests I have taken, containing single eggs, the eggs have been fresh, and wherever the eggs were hard-set, or there were young birds, the number was two. The eggs are greenish white, unspotted, and rather smooth, but with no gloss, with a pale green or *eau de nil* lining. The average of six eggs measured gives a length of 2·81 and a breadth of 2·07, the largest egg measuring 3 by 2·06, and the smallest 2·71 by 2·04."

Captain E. R. Shopland, I.M., took an egg of this Eagle from a nest built in a high tree in the compound of the Public Hospital, Akyab, on the 11th December; it was of a chalky-white colour and very rough in texture.

Colonel Legge remarks that this species breeds in Ceylon during the months of December, January, and February.

The egg received from Nancowry was a very broad regular oval, scarcely larger at one end than the other. The shell is rather rough, entirely glossless, and densely pitted with large conspicuous pores. The ground is dull white, but this is smudged and stained with a dirty brown, probably from the droppings of the parent bird. Held up against the light the shell was a very dark green. The egg measured 2·5 by 1·01.

Another egg from Suvamdurg on the Malabar coast is rather more elongated in shape, but otherwise very similar. In all the eggs of this species which I have yet seen (and they are very variable in size and shape) the shell, when held up against the light, has been of the same intense blackish green as in *H. leucoryphus*, but it is rather rougher than in that species.

### *Haliaëtus leucoryphus* (Pall.). *Pallas's Sea-Eagle.*

*Haliaëtus fulviventer* (*Vieill.*), *Jerd. B. Ind.* i, p. 82.

*Haliaëtus macei* (*Cuv.*), *Hume, Rough Draft N. & E.* no. 42.

Pallas's Sea-Eagle lays from the beginning of November to the early part of February. The greater number of these birds, however, lay in December, and most of the nests that I have examined later than the 15th of January have contained young ones.

They build on large trees, on the peepul by preference, I think, but also on many other kinds, sheeshum, banyan, &c. The trees that they select are almost invariably solitary ones, situated either on the banks of some river, or beside some considerable jheel. In Upper India I do not know a single large jheel which retains water in it as late as February, where a pair of this species does not breed; and all down the Jumna, Ganges, Chambul, Indus, Chenab, Jhelum, and Sutledge, wherever I have been, I have in-

variably met with at least one pair every 3 or 4 miles, and in particular localities every half mile !

The nest is a huge platform of sticks, some of which are often as thick as a man's arm, with a superstructure of thinner sticks and twigs, and with only a slight depression towards the interior, which is lined with fine twigs and green leaves, occasionally intermingled with rushes and straw.

The nest is usually placed in a broad fork, near the very top of the tree, on branches that seem scarcely strong enough to support the huge mass, and is sometimes occupied by the same pair for many successive seasons.

I do not think that this species ever takes possession of other birds' nests. It either builds a new one for itself, or repairs one formerly belonging to it, even though this may in the interim have been usurped by *Otagypys calvus* or *Ketupa ceylonensis*, both much addicted to annexing the poor Fishing Eagle's laboriously-constructed nest. I say laboriously constructed, because I once watched a young pair constantly occupied for a full month building a nest, which they were still at work finishing off when I left. Nothing can seem rougher or more rugged than their nest when finished, and yet out of every four sticks and branches that they brought they rejected and threw down at least three. Both birds brought materials, and side by side the pair would work away, throwing down almost as many sticks as they had brought; then apparently they would quarrel over the matter—there would be a great squealing—and one would fly away and sit sulky on some cliff-point near at hand; after a time the one left on the nest would go off in quest of materials. Immediately, the other would drop softly on to the nest and be very busy (though what they did, except lift a stick and put it down in the same place, it was impossible, even with a good glass, to make out) till the absent bird returned, not unfrequently, with a fish instead of a stick.

One curious point about these birds is that, unlike most Eagles, they do not always desert a plundered nest. I have twice taken single eggs out of nests, and ten or twelve days later, on re-examining the same nests, in consequence of observing the birds still hanging about the place, I found that a couple more eggs had been laid since my last visit.

It does not do to dogmatize about the habits of birds. I have examined fully fifty nests of this species, some containing eggs and some young ones, and were I to trust to my own personal experience alone, I should certainly assert that the old birds *never* show the least fight in defence of their homes and progeny. Nevertheless, one of our most accurate observers certifies to their excessive pugnacity when they have young. Captain Hutton, in the 'Journal of the Asiatic Society,' remarks :—

"I notice this species because Captain Tickell states that it never makes the slightest attempt at defending its nest—a striking contrast to the marvellous tales we read of concerning the Golden Eagle in the Highlands of Scotland, &c. This remark is correct

only so long as there are eggs in the nest, for no sooner are these hatched than the temper of the bird becomes wholly changed, and it will then defend its young with fierceness and determination. The nests I have repeatedly found and robbed, both on the banks of the Ganges and of the Sutledge, and in all cases where they contained only eggs, not the least show of resistance was made, the old birds either sailing off with a loud querulous cry, or sullenly remaining on an adjacent tree, watching the robbery that was going on. On one occasion, however, I met with a very different reception, when my servant was attacked with an unexpected ferocity from which nothing but my gun could have saved him. The circumstance occurred in January 1832, when on my way up the country. The nest was placed near the summit of a tree, growing on one of the Colgong rocks, in the middle of the Ganges, and contained two half-fledged young ones. The old birds offered a most determined resistance, and without the aid of fire-arms we should decidedly have been defeated, as they dashed fiercely and fearlessly at the man in the tree, who prayed hard to be allowed to descend, and was only kept at his post by the promise of reward and fear of the cudgel. At first we had to contend with the female only, but after one or two rapid swoops and dashes at the robber's head, which he avoided by bobbing under the nest, finding she could make no impression, she suddenly uttered a shrill cry, which was responded to in the distance, and in an instant after her mate was seen swiftly gliding to her aid from the opposite bank of the river. The two then charged together towards the nest with the rage and fierceness of despair, and so terrified the man in the tree, hampered as he was with the young ones, that, had I not fired at and wounded the Eagles as they advanced, they would assuredly have hurled him into the river. In this manner, however, after repeated attempts to come to the rescue, we managed at last to drive off the old birds and secure the booty. At the end of five weeks the young ones exhibited as nearly as possible the plumage of the bird figured by Hardwicke and Gray as *H. lineatus*."

More recently Captain Hutton sent me the following further remarks in regard to this species:—"In the Dehra Doon this bird is extremely common, but it merely skirts the outer hills, about 5500 feet, without entering them. I have seen six to eight together passing along the side of the hills below Mussoorie for some distance, and then returning again together in like manner; but what the object can be, I cannot make out. There is no fishing-ground along that route. They build in lofty trees on the banks of the larger Doon streams, laying one or two large white eggs. The nest I have described in the Journal of the Asiatic Society of Bengal."

The usual number of eggs laid by this species is three; but I have myself twice found four, and it is not at all uncommon to meet with only two eggs, fully incubated, or two young ones, in a nest.

Major Bingham writes:—"On the eastern and more wooded bank of the Ganges at Allahabad, a pair of these Eagles can be seen at almost every half-mile or so. Between the 3rd and 12th November, I found no less than five nests between Jhoosi and Mhow Serai Ghats. Three was the greatest number of eggs I found in any one nest, and I think that is the usual number laid. All the eggs I have are of one type, roundish, and it strikes me rather small eggs for the size of the bird, of a pure greyish-white colour, without spot, blotch, or marking of any kind."

"The nests were large, round, neat structures of twigs and branches, lined thickly in only two cases with straw, and in the others containing a mere apology for a lining in the shape of a few leaves. Four nests were placed on the very summit of large peepul-trees, one on a banyan."

Writing from Sind, Mr. Scrope Doig says:—"Found several nests between the 10th of November and 7th December. Nests were built on trees in the middle of swamps, the trees were usually decayed and totally devoid of foliage. In only one instance did the parent birds try to prevent their nest being robbed, and in that case there were young birds in the nest. Out of one nest I found on the 10th of November I took two eggs; again on the 20th November I got another egg out of the same nest; and again on the 7th December I got two eggs from the same nest, both of which were incubated. The nests were from 12 to 30 feet above water-level."

Mr. J. R. Cripps writes from Eastern Bengal:—"Much more common than the last species. It breeds in the district, and is a permanent resident. I put off securing a specimen, and eventually left the district without getting one. I noticed three or four of their nests, but during the time they were breeding (November and December) I was confined to my bed, so lost their eggs. Tamarind, bombax, and peepul trees are generally chosen. A Hindoo, in whose compound grew a large tamarind-tree on which there was a nest of one of those birds, begged me not to shoot them, as they judged the hour by them. They say the birds call every three hours by night or day. They often carry off wounded game, and on one occasion I saw a wounded *C. rutila* taken away by one of them. Fish, however, are their principal food. I once rescued a large fish (13 lbs. in weight) from one of these birds. It had after a great difficulty brought the fish to the shore, and on my running up to the spot flew away without the fish."

Mr. Oates, referring to this Eagle in Pegu, says:—"Eggs may be procured here from the 28th November to 29th December. When the eggs are taken, the female lays again in the same nest. Eggs always three. I have robbed one nest for four consecutive years (in one year twice), and nothing will induce the birds to desert the nest. Abundant in Lower Pegu."

Typically the eggs of this species are a rather broad oval, but a good deal of variation both in size and shape occurs. I have one or two very long and one very broad pyriform egg; but these are

exceptions. The colour is greyish white; and every specimen that I have yet seen (and some fifty have passed through my hands) has been absolutely unspotted. No doubt, as incubation proceeds, like most other Eagles' eggs, they become much soiled and stained with dingy yellow; but none have exhibited any trace of the markings shown in Dr. Bree's figures.

The eggs of this species can, I think, generally be separated from those of most of our other Indian Eagles, except those of *Polioaëtus ichthyaëtus* and *Spizaëtus nepalensis*, by the intensely dark green of the shell when held against the light. If it is possible to separate any of our Eagles' eggs by the texture, I should say that, as a rule, there is generally a certain smoothness in the feel of these eggs which distinguishes them from those of other species; but this is by no means an invariable test.

The eggs vary from 2.55 to 3 inches in length, and from 2.02 to 2.27 in breadth; but the average of thirty eggs measured was 2.77 by 2.17 inches.

**Polioaëtus ichthyaëtus (Horsf.). *The Bar-tailed Fishing-Eagle.***

*Polioaëtus ichthyaëtus (Hodgs.),* *Jerd. B. Ind.* i, p. 81; *Hume, Rough Draft N. & E.* no. 41.

I have myself never yet seen an Indian specimen of the Bar-tailed Fishing-Eagle from any locality westward of Nepal, though I have it from Sikkim, Bengal, and Burma. It is the next, and not the present, species which is so common along the bases of the Himalayas, from Kumaon to Afghanistan. Dr. Jerdon had never clearly discriminated the next species, but he noticed its distinctness from the present one directly I showed him a specimen; so that, I think, we may accept his remarks as to the breeding of this species as really referring to the present and not the next species.

He says:—"I found its nest on several occasions: once near the Nerbudda in a large tree; again, near Saugor, on a tree on the top of a height overlooking a large tank; and in a tree on the skirts of a village near the Ganges, opposite Rajmahal, I found a whole colony of nests of this Eagle. The nest is a very large structure of sticks. In one nest there were unfledged young; the others were empty."

Mr. J. R. Cripps writes:—"On the 12th March I saw one of these birds sitting near a couple of nests which were high up on a kuddum-tree in a ryot's holding, and overlooking a large 'beel.' The ryot told me the young had flown by the beginning of February, and that the eggs are laid in the latter end of November. On my asking if the two nests belonged to two pairs, he said no; but that while one bird sat on the egg in one nest, the other bird occupied the empty nest. It is a permanent resident and rather common."

Major C. T. Bingham, writing of this bird in Tenasserim,

says:—"A bird much oftener seen than shot. It is quite common along the course of the Attaran with its two branches, the Zammee and Wimgeo choungs, on the Yoonzaleen and along the whole length of the Thoungeen from its sources to its mouth. In my many trips up the Salween, the largest river of the lot, to which the others are but tributaries, I have not, strange to say, noticed a single one.

"On the 3rd March, being encamped near the mouth of the Hteekleethoo choung, a small stream falling from the east side of the Meplay East Watershed range, and flowing to the Thoungeen river, my attention was attracted, as I sat outside my tent in the evening, by the persistent passing of one of these Eagles backwards and forwards between two large kanyin trees (*Dipterocarpus alatus*). The trees not being more than a few hundred yards off, I made my way to them, and found that a large stick nest had been built in the first fork of the largest of them, at a height of at least a hundred feet.

"Next morning I sent up a couple of Karens, who managed to climb the tree in the usual way by means of bamboo pegs, and brought me down the solitary egg the nest contained. The nest they, or rather the one man who went up the whole way, described as a large mass of sticks and twigs without any depression in the centre scarcely, and unlined.

"The egg was chalky white, rather a broad oval, without markings of any kind, and perfectly fresh. It measures 2·58 by 2·03 inches. During the robbery the birds flew about uneasily round and round the tree, but out of shot, and it was not till after an hour's watching and stalking I managed to bag one of them, which, on dissection, proved to be the female with another perfect but shellless egg inside her."

Colonel W. V. Legge, writing from Ceylon of this Eagle, says:—"The Fish-Eagle breeds with us in December, nesting in large trees, both along the coast and by the side of the fine old tanks in the Northern and Eastern Provinces. I find from my rough notes that a nest, from which, on the 4th of January, 1873, I took a young bird six weeks old, was made in the fork of an upper limb of a large tree on the sea-coast to the north of Trincomalie; it was constructed of sticks, some of them an inch in diameter, and measured 3 or 4 feet across in one direction, and about 2½ feet in another, and contained enough material to have half filled an ordinary bullock cart. The interior was very flat and constructed of small twigs."

The egg is of the usual type, a broad but pretty regular oval slightly pointed towards one end. The ground greyish white, often a good deal soiled in the course of incubation, but in the case of all the few specimens I have seen devoid of markings. Held up against the light the shell is very pure, rather bright, sea-green. There is less pitting, I think, on the surface of the eggs of this species than those of many other allied species, but I have seen too few of the eggs to speak positively on this head.

Two eggs measured 2·7 by 2·1 and 2·63 by 2·08.

*Polioaëtus plumbeus* (Hodgs.). *The Himalayan Fishing-Eagle.*

*Polioaëtus plumbeus* (Hodgs.), *Hume, Rough Draft N. & E.*  
no. 41 bis.

The Himalayan Fishing-Eagle, generally, I believe, lays in January; but in the valleys of Kumaon and Gurhwal, where it is, I know, far from uncommon, it is said to lay as late as April.

It builds invariably, as far as I have yet observed, on large trees situated on the bank of some river, or in the immediate proximity of some considerable piece of water. It constructs its own nest, returning, like the Golden Eagle, year after year to the same spot, and each year adding fresh materials, so that the nest, a very large one to begin with, grows in time to an enormous size, reminding one of Wilson's description of those of the Osprey. Stout sticks and small branches, mingled with twigs and grass-roots, are the principal materials; but weeds and coarse grass help to fill up the interior, in which, as in the case of Bonelli's Eagle and others, a thin layer of green\* leaves is commonly spread for the eggs to rest on. The eggs are normally three in number; but I have twice seen only two eggs in a nest, in both cases fully incubated.

The late Major Cock sent me the following note from Hassen Abdul in the extreme North-west:—"The nest of this species is a very large structure of sticks, in fact the biggest nest that I have known of. I found one on the top of a high thorn-tree on the banks of a river. When I first visited the nest it was empty, but the bird was sitting on the tree near it. I again visited the nest about a fortnight later, and found three eggs in it. The nest was about  $5\frac{1}{2}$  feet in height, about  $4\frac{1}{2}$  in diameter, and but slightly hollow. There were lots of leaves in the nest quite fresh. The leaves belonged to some small shrub (the leaf itself was a very small one), and were evidently placed there to make a softer bed for the eggs. The birds had built in the same tree for an immense time, but at length the tree was blown down, and they built on the next biggest tree to it, and have continued for the last few years to nidificate there. The eggs are dirty white, similar in shape and size to the one sent to you. The birds did not exhibit any anger when their eggs were taken, but the female flew round and round a few times."

Captain Unwin remarks:—"I found a nest of our Himalayan Fishing-Eagle in the neighbourhood of Hazara on the 27th Feb-

\* It is probable that the object of laying the eggs on green leaves is to secure a certain amount of moisture for the shells.

Eggs artificially hatched have, we know, to be daily sponged with a moist cloth. Great numbers of birds leave their eggs for a short time about sunrise to feed in grass and jungle, and return all "dewy-breasted" to their nests, so that I have taken Pea-fowl's eggs quite wet from this cause. But how is sufficient moisture secured for eggs laid, like those of the Sand-Grouse, on the bare, absolutely dry sand, whose parents feed in the driest ground (never even when they drink wetting their feathers in the slightest), and return dry-breasted to their eggs?

ruary, 1869. The nest was situated in a large tulip-tree, about 35 feet from the ground. It was built of sticks, stubble, weeds, and coarse grasses, and was about  $2\frac{1}{2}$  to 3 feet in diameter. It contained two young birds. The villagers stated that the old birds arrived every year about November. The probable age of the young was four or five weeks; they were unable to fly, though one was pushed outside the nest. I subjoin the dimensions and a brief description of one of these young birds which I took from the nest. Later, while watching the tree through a glass from a distance of some 150 yards, I saw one of the old birds arrive with a fish, I should think nearly 2 lbs. in weight, in its claws."

My friend, Mr. Thompson, writes to me from Gurhwal that these birds "breed from March to May. The nest, which is a large structure of small sticks and twigs loosely put together, is usually placed in a tree at a convenient distance from the water, and at no great height from the ground. I have found their nests on the Kossilla River, at Oomta Dabee, in the Patlee Doon, on the Ramgunga River; Kotree Doon on the Sunnai River; and lastly above Hurdwar on the River Ganges. They lay from two to three large white eggs, smaller than those of *Haliaëtus leucoryphus*. Three appears to be the normal number of their eggs. During the breeding-season the birds utter at intervals a loud, yet plaintive cry, especially whenever one of them approaches the nest whilst the other is sitting on it. The male during this time is assiduous in his attentions, and the meeting of the pair on his return from fishing-excursions always appears to call forth fresh cries. About the middle of April the eggs are laid, and are hatched during the following month. These birds are generally distributed over the rivers and larger streams of the Sub-Himalayas, remaining on them throughout the year."

The only egg I now possess (which I owe to Major Cock) is a broad and very perfect oval in shape. In texture it is rough and pitted, but it nevertheless has a slight gloss. It is a perfectly unspotted egg, and though in places somewhat soiled and discoloured, must, when fresh, have been a nearly pure milk-white. Held up against the light, the shell is even a darker green than that of *H. leucoryphus*; in fact, it is almost black. Whether this character is general, or peculiar to the single specimen I now possess, I cannot of course decide. I have had many of these eggs in former years; but I did not then, unfortunately, collect specimens.

Five eggs, of which I have recorded measurements, varied from 2.72 to 2.8 inches in length, and from 2.1 to 2.15 in breadth.

***Haliastur indus* (Bodd.). *The Brahminy Kite.***

*Haliastur indus* (Bodd.), *Jerd. B. Ind.* i, p. 101; *Hume, Rough Draft N. & E.* no. 55.

The Brahminy Kite lays from January to the early part of

April, according to season and locality. Like many other species, it breeds earlier in Lower Bengal than up-country. In Upper India, where it is comparatively rare, it almost invariably makes its nest in the neighbourhood of water, building a rather large, loose, stick structure, scarcely, if at all, distinguishable from those of the Common Kite (*M. govinda*), high up on some large mango, tamarind, or peepul tree. The nest, which is from 18 inches to 2 feet in diameter, and from 3 to 5 inches in depth, with a rather considerable depression internally, is sometimes perfectly unlined, at other times has a few green leaves laid under the eggs, as in an Eagle's nest, but most commonly is more or less lined, or has the materials of the inner part of the nest intermingled with pieces of rag, wool, human hair, and the like.

Most commonly only two eggs are laid, but three are by no means uncommon, and one of my correspondents notes finding four in one nest, a very unusual number.

Mr. F. R. Blewitt says:—"This Kite was found breeding in the Sumbulpore District in the latter part of January; in the Raepore District in February, March, and April. The tallest tree of a group, in the neighbourhood of a large tank or sometimes near to a stream, is almost invariably selected for its nest. This nest, most frequently made on one of the upper higher branches, is loosely constructed of coarse twigs, having the depression in it often lined with grass, leaves, or odd pieces of rags. Three is the maximum number of eggs."

Colonel G. F. L. Marshall says of this species:—"Breeds in the Saharunpoor District. I saw a female on her nest in a huge dry tree in the early part of March, but as the tree was inaccessible, I was obliged to leave it; the nest was of sticks about 50 feet from the ground."

Mr. R. Thompson remarks:—"At Shahgunj, Pergunnah Bhurrur, District Mirzapore, I saw on the 6th March, 1869, a pair of these birds building their nest, which was placed in a mango-tope, on a tall tree. There were no eggs, as the birds had not then laid, but the nest was as complete as it could be."

"The nest was like that of *M. govinda* and placed on a very high branch."

Dr. Jerdon tells us that "the Brahminy Kite breeds on trees in February and March, making a not very large nest of sticks, sometimes lined with mud, and laying generally only two eggs, which are sometimes dirty white, at other times white with a few rusty-brown spots. In the Carnatic it usually selects a palm-tree to build in. Layard says that it makes several false nests, and that whilst the female is incubating, the male generally occupies one of the nests first made."

Mr. G. Vidal records the following note from the South Konkan:—"Breeds from the middle of January to end of March. Prefers cocoanut-trees on the coast, and mango-trees inland. Deserts its nest on the slightest provocation."

Messrs. Davidson and Wenden, writing from the Deccan,

say :—“ Rather rare : but on 16th January D. shot a female from a nest (no eggs) on a small bush growing out of a rocky bank, 30 or 40 feet high, on the Bhima River. On dissecting her he found that the eggs would probably have been laid a week later. A nest with one egg and a young bird was taken on an island in the River Bhima, on 24th April. Observed nestling on the Dew River, 14 miles from Poona, on 14th February.”

And Mr. Davidson further writes :—“ The Brahminy Kite is exceeding common among the tanks in Mysore, and its habits differ there from its habits in the Deccan. In the Deccan, where it is rare, it is a shy bird, clinging to and breeding along the large rivers. In Mysore it haunts the rice-land, and seems to have no favourite breeding-place. I have found nests high up on tall trees far away from a village, and others not 15 feet from the ground in the middle of a village, though I think the majority are on lowish trees among the rice-fields. The nest resembles that of the Common Kite externally, but has less lining. The eggs vary much in size, and are not so round as the Common Kite’s. About one half are quite white, and all the others I have taken (about twenty in all) had a few dark purple scratches or ticks all over them, and there was not a boldly-marked egg amongst them.”

Colonel Legge remarks :—“ This species breeds in Ceylon in February and March.”

Mr. J. C. Parker says :—“ On the same day (February 1) and on a peepul-tree adjoining the one on which was the Vulture’s nest, I secured two fresh eggs of this species. No two eggs could be more different as to colour—the one being perfectly clear bluish white with but one or two minute claret-coloured spots; the other richly coloured, this I discovered after removing the thick coating of mud with which it was completely covered.”

Mr. J. R. Cripps, writing from Furredpore in Lower Bengal, says :—“ On the 27th February, 1878, I took two partly-incubated eggs from a nest built in amongst the leafy branches and near the top of a *Ficus religiosa* tree, some 35 feet off the ground. The nest was of the Common Kite type, of twigs with a lining of cow’s hair and a few grasses. On the 20th November, 1877, I noticed one of the above pair carrying twigs up to this peepul-tree, which was in my factory compound. I sent a man up ever so often to see if there were any eggs, but it was the 27th February before they were secured. Mr. Oates (S. F. vol v. p. 142) also alludes to the length of time taken by this species to build.”

Mr. J. Inglis remarks of this Kite in Cachar :—“ The Brahminy Kite is very common throughout the year; it breeds in March and April; it generally fixes on a mango or peepul tree, close to a village.”

Mr. Oates notes that this species in Pegu “ takes a long time to build its nest. My first eggs were taken on the 18th February.”

Major C. T. Bingham writes from Tenasserim :—“ In the Thoungyeen this is the commonest of the Raptore.

"I noticed a pair breeding near Kaukarit on the Houndraw river, but the nest, when examined on the 4th April, was still unfinished."

The eggs vary in shape of course, but typically are very perfect, moderately broad, ovals, only slightly compressed towards one end ; as a rule, they are smaller, and, as far as my experience goes, far less richly coloured than those of *M. govinda*. The ground-colour is greyish white, sometimes unspotted, but dingy, sometimes feebly speckled and spotted, at times, towards one end only, with pale dingy brown, and sometimes scantily blotched and spotted with reddish brown. In size the eggs vary from 1.85 to 2.2 inches in length, and from 1.5 to 1.79 inch in breadth ; but the average of eighteen eggs measured was 2.02 by 1.65 inch.

**Milvus govinda, Sykes. The Larger House-Kite.**

*Milvus govinda, Sykes, Jerd. B. Ind. i, p. 104; Hume, Rough Draft N. & E. no. 56.*

The House-Kite lays at very different seasons in different localities. In the plains of Upper India and the Punjab the great majority lay in February, a few only breeding in the previous and succeeding months. Lower down country, they are, I believe, earlier, and I myself have taken eggs as early as Christmas Day. In the districts bordering on the bases of the Himalayas, March is the more general time ; while in the Himalayas, where our bird is common up to a height of 6000 or 7000 feet, they mostly lay in April and May. Everywhere stragglers breed earlier and later, by nearly six weeks, than the great body of the birds do ; so that, even in the neighbourhood of Agra, we have eggs recorded as early as the 29th December and as late as the 13th April. In Bareilly, I took a nest of fresh eggs on the 9th May, and at Simla found three much incubated ones as late as the first week in June. They build almost without exception on trees ; but I have found two nests (out of many hundreds that I have examined) placed, *Neophron*-like, on the cornices of ruins.

The nest, mostly placed in a fork, but not uncommonly laid on a flat bough, is a large clumsy mass of sticks and twigs, the various thorny acacias appearing to be the favourite material, lined or intermingled with rags, leaves, tow, &c. The birds are perfectly fearless, breeding as freely on single stunted trees, situated in the densest populated bazaars, or most crowded grain-markets, as on the noblest tree in the open fields. The great majority breed in the suburbs of the towns and villages, the offal of which supplies their daily food ; but single nests may be found far away from human habitations in almost virgin jungle.

Two appears to be the normal number of eggs, but they often lay three. Twice I have obtained four, and on several occasions I have met with a single hard-set egg, or young one, in a nest.

When robbed of their eggs, the old birds, as a rule, mope about the place without laying more eggs, or attempting to build a fresh

nest ; but I have known several instances in which more eggs were laid in the same nest, and one in which an entirely new nest was constructed by the old birds in an adjoining tree, in which a single egg was laid and hatched.

Colonel G. F. L. Marshall, writing from Saharunpoor, remarks that this species "generally breeds in February and March ; but I have taken eggs as late as the end of April. It usually lays three eggs, but will lay more if some of the eggs are taken. I took two out of three eggs from one nest, leaving one to prevent the bird forsaking the place. A short time after, I sent a shikaree to shoot and bring me the bird ; he mistook my orders and brought the eggs ; there were three then, two more had been laid ; after this one other egg was laid, and then the nest was forsaken. The nest was in my own compound, so that I had ample opportunities for watching it."

Mr. R. M. Adam says :—" This bird breeds at Sambhur during March and April. I have generally found the nest on large peepul-trees. The nests which I have taken contained sometimes two, sometimes three eggs."

Mr. W. E. Brooks remarks that this species is " tolerably common both at Nynee Tal and Almorah, at both of which places it breeds about two months later than it does in the plains."

Major C. T. Bingham remarks :—" Breeds both at Allahabad and at Delhi in March and April."

Colonel Butler contributes the following notes :—

" In Kurrachee, as there are no trees, the Kites generally build their nests on the tops of the houses, often on a sloping roof, parapet of a wall, chimney, &c. One nest I saw built halfway up the flagstaff outside the Brigade Office, on a wooden platform intended for the man to stand on when lowering or raising the signal flags.

" The Common Kite breeds in the neighbourhood of Deesa, principally in the month of February. I have found as many as four eggs in one nest, but two is certainly the normal number. They often begin to build their nests as early as November, and I took one nest this year on the 27th November containing two eggs slightly incubated, and another on the 17th November containing two fresh eggs.

" Belgaum, 17th November, 1879. Found a Kite's nest containing a single fresh egg. On the 20th inst. revisited the nest and took three more fresh eggs."

Mr. Scrope Doig writes from Sind :—" Took several nests between the 9th of February and beginning of April. Their nests were, as a rule, built on pollarded kundy and tamarisk trees in the vicinity of villages. In some instances the parent birds showed a very determined objection to having their nests robbed."

Messrs. Davidson and Wenden, writing of the Deccan, say :—" The only Kite identified by D. was *M. govinda*. It breeds freely from middle of September to middle of March. Greatest number of eggs found in a nest was three."

Mr. Benjamin Aitken remarks:—"Regarding the seasons of breeding of this species, I have the following notes recorded of observations extending over several years:—

" 5th January. Breeding at Akola, Berar.  
 " 1st-8th Feb. Breeding at Akola, Berar.  
 " 22nd Feb. Breeding in Bombay.  
 " 26th Feb. My brother wrote to me: 'Kites are sitting all over Poona.'

" 27th April. Birds sitting all over Poona.  
 " 13th July. Breeding in Kurrachee.  
 " 24th Sept. Madras; saw a Kite carry away a long shred of cloth for its nest.  
 " 29th Nov. Saw a Kite carrying a twig or straw a yard long to its nest."

" 6th December. Watched a Kite carrying sticks to its nest.  
 " In Ceylon," says Colonel Legge, "the Pariah-Kite breeds, as I am informed, in the north about May."

Mr. Davison tells me that "the Common Kite breeds on the Nilghiris, but not very abundantly, during the months of December, January, and February, and I have taken the nest at Madras in the latter end of December; on the Nilghiris the nest is usually placed high up in some solitary tree. This Kite is very common on the Nilghiris, ascending quite to their summits; they usually roost in company at night in some large tree, often in company with *Haliastur indus*."

As regards the eggs themselves, the countless variety of types of coloration which they exhibit defy description. I have before me now specimens absolutely devoid of any trace of colour which might well stand for gigantic specimens of *Butastur teesa*, but these of course are very exceptional; I have only two such in a series of several hundreds. The ground-colour is almost invariably a pale greenish or greyish white, more or less blotched, clouded, mottled, streaked, pen-lined, spotted, or speckled with various shades of brown and red from a pale buffy brown to purple, and from blood-red to earth-brown. Many of the eggs are excessively handsome, having the boldest hieroglyphics, blotched in blood-red, on a clear white or pale green ground. Others again are covered with delicate markings, as if etched on them with a crow-quill, but no doubt the markings in the majority are more or less smudgy, and but dingly coloured. In some few the ground-colour is a dull mottled purple, clouded over with deeper shades of purplish brown. Compared with many other species, the eggs do not vary so very much in size or shape; they are normally a very perfect oval, scarcely more compressed at one end than at the other, but elongated, pointed, spherical, and pyriform varieties occur. The colour of the shells, when held up to the light, varies a good deal; in some it is as light a green as *Circaetus gallicus*, in others as deep as in *Haliastus leucoryphus*.

Although, as a rule, the eggs are glossless, a good many, when freshly laid, bear more or less of a natural glaze, which vastly brightens their colouring.

In size the eggs vary from 1.9 to 2.35 inches in length, and from 1.55 to 1.85 inch in breadth; but the average of 273 eggs measured was 2.19 by 1.77 inch.

**Milvus affinis**, Gould. *The Smaller House-Kite.*

*Milvus affinis*, Gould, *Hume, Cat. no. 56 ter.*

Of the Smaller House-Kite, Mr. Oates writes:—"Nests commonly throughout all Pegu. Usually three eggs. From 3rd week in January to end of March. The nest answers well to Mr. Hume's description of that of *M. govinda*. Average of 12 eggs 2.09 by 1.63; in length they vary from 2.2 to 2.0, and in breadth from 1.75 to 1.55; the egg-lining is bright green; the shell tolerably smooth and glossless; ground-colour dull white, and all the eggs I have are marked and blotched with rust-colour, bright in the majority, but pale in a few. The marks are reduced to mere specks in one or two eggs."

Mr. W. Davison tells us:—"I obtained two eggs of this Kite at Moulmein on the 5th of January. In appearance they are quite similar to many of those of *M. govinda*, and, as is not unfrequently the case with Kites' eggs, though both were taken from the same nest they are very dissimilar in appearance—one being blotched and spotted, but only at the large end, with a dark umber-brown, some of the spots and blotches being almost black; the rest of the egg is sparsely spotted and blotched (but the blotches are small) with a paler brown. The markings on the egg, which are also at the large end, consist of a medley of streaks and scratches and irregular spots of a rusty brown, the whole of the remainder of the surface being covered with numerous scratches of a very pale inky purple and a few very faint spots of a paler rusty brown. These two eggs measure 2.11 by 1.71 and 2.08 by 1.7."

"The nest, the usual shallow saucer of dry twigs, &c., was placed in a moderately high tree about 30 feet from the ground."

Except that they are rather smaller and, as a rule, rather more poorly marked, the eggs of this race or species are so precisely similar to those of *M. govinda* that any separate description is needless.

**Milvus melanotis**, Temm. & Schleg. *The Jungle-Kite.*

*Milvus major*, Hume; *Hume, Rough Draft N. & E. no. 56 bis.*

*Milvus melanotis*, T. & S., *Hume, Cat. no. 56 bis.*

The Jungle-Kite lays in the Himalayas from January to the beginning of May.

They build large stick-nests, similar in every respect apparently to those of the House-Kite and placed like theirs on trees. I have obtained the eggs from Kooloo, Busahir, Koomarsain, and other portions of the hills, north, north-east, and north-west of Simla. Mr. Brooks obtained the eggs in Kashmere in May.

The eggs appear to differ in no very perceptible degree from those of the Common House-Kite except in size. Even this difference is not very marked in all specimens. Out of 273 Common Kites' eggs, the average dimensions are 2.19 by 1.77, the longest egg measured 2.35, and the broadest 1.85. About one in ten of these eggs exceeded 2.29 in length. Of the 13 eggs of *Milvus melanotis* now before me, only one falls short of 2.3 in length or 1.8 in width, and the largest egg measures 2.43 by 1.85. Taken as a *body* they are conspicuously larger than those of the ordinary *Milvus govinda*. As before remarked, in general appearance and colour they resemble the eggs of this latter, but some of them are perhaps more richly marked than any that I have met with amongst these.

They vary in length from 2.23 to 2.43 inches, and in breadth from 1.75 to 1.88 inch; but the average of thirteen eggs is 2.31 by 1.8 inch.

*Elanus cæruleus* (Desf.). *The Black-winged Kite.*

*Elanus melanopterus* (Daud.), *Jerd. B. Ind.* i, p. 112; *Hume, Rough Draft N. & E.* no. 59.

The Black-winged Kite varies much in its time of breeding. Possibly these birds breed twice in the year, but this is not likely, and the difference in season in the several localities is probably due to the great differences in the climate and rainfall of the latter.

Mr. Blewitt remarks:—"This Kite evidently breeds from, I should say, the middle of November to January. I first secured its eggs in the Sumbulpoor District on the 20th December, while I obtained a pair of quite young half-fledged birds on the 21st January. The nests, including a newly-made one found empty, were placed on the forks of the upper branches of low forest trees about 18 to 20 feet from the ground. In form they were circular and composed of small sticks and twigs somewhat compactly put together, with the egg-cavity about an inch deep, neatly lined with fine grass. There is no doubt that this Kite breeds in all those tracts in the Sumbulpoor District that are sparsely wooded and extensively cultivated with rice; and probably, as it is somewhat common there, this may also be the case in the Raepoor District. I take three to be the normal number of the eggs."

Mr. Adam says:—"At the village of Kuchrodda, about 6 miles south of the town of Sambhur, there is a large jheel with a tope of khajur palms (*Phoenix sylvestris*) on one side, and straggling trees of this species all round.

"On the 19th July, 1872, near one of the solitary khajur-trees, I observed a Black-winged Kite, and as this bird is rather rare about the Sambhur Lake, I went in its direction, intending to kill it; but just as it rose from the ground, I saw it was carrying a twig in its bill, and this it carried to the top of the khajur, where I found it had a nest nearly finished. Both birds were employed taking twigs to the nest.

"On the 7th August I sent a man to see if the nest contained eggs, but he found it had been abandoned, and a new nest commenced on one of a group of six lasora-trees (*Cordia myxa*) which stood near to the khajur. He also informed me he had seen the birds together.

"I inspected the nest on the 10th August, and found one of the birds sitting on it. The nest was so loosely constructed that with my binoculars I could see that it contained no eggs.

"I again inspected the nest on the 14th August, and found that it contained two eggs. One of the birds sat close on the nest, and would not be frightened off by a man beating on the trunk of the tree with a stick, and this same bird made a swoop at my servant as he was climbing the tree.

"The nest was situated on the very top of the lasora-tree, and was from 25 to 30 feet from the ground. In shape it was circular, and with the exception of two or three pieces of sarpat grass, there was no attempt at lining. It was about 10 inches in diameter, and the egg-cavity had a depression of about 2 inches. The twigs of which the nest was composed were of a uniform size throughout, and were very loosely and openly laced together."

Mr. R. Thompson informed me that in Lower Gurhwal and the Dehra Doon, "they breed from April to June, choosing low trees, usually one standing by itself, in (for those localities) sparsely wooded spots to build on. The nest is circular, not unlike that of *Corvus macrorhynchus*, composed of small sticks and twigs and lined with fine grass and fibres. This species is sparingly found along the foot of the Himalayas. It does not enter valleys unless, as in the case of the Patlee and Dehra Doons, they happen to be pretty open." Writing later from the Central Provinces, he says:—"In the Central Provinces, the breeding-season is from December to January; the nest was placed upon small trees from 15 to 20 feet from the ground. It is circular like a Crow's nest, of about the same size and composed of the same materials. I have now found two unfinished nests of this bird. The first was in the Saugor District, on the banks of a small nullah, in a pretty open bit of country, yet sufficiently wooded to keep the place moist and damp. This nest was found on the 17th November, 1869. The second one, found in the Seoni Plateau on the 6th January, 1871, was placed on a small *Boswellia thurifera* tree, on the edge of a deep ravine. The male bird was observed rising from the ground carrying a twig in his bill and going directly into the tree. This fact led to the finding of the nest, which was nearly complete. In the valleys of the Meikle Range, in the winter of 1869-70, I frequently met with this Kite and broods of young ones, and even saw their nests, but have not been fortunate enough to find the eggs."

Colonel Butler writes:—"I found several nests of the Black-winged Kite this year, 1876, dates of which are given below. The nests were all built by the parent birds themselves, and consisted of a quantity of dead sticks open at the top, and more or less densely constructed towards the centre. The whole of the nests

were built near the top of low thorny trees growing in grass-berrhs, at heights varying from 9 feet to 15 feet from the ground. The nests are not difficult to discover if the birds are watched in the breeding-season (although I never saw a pair in the act of building), as either one or both of the old birds are invariably to be found on guard, sitting on some low tree near the nest; and after observing them in the same place once or twice you may be pretty sure that there is a nest at no great distance, and if you examine every conspicuous thorny tree within a radius of 150 yards from the tree the birds frequent you are almost certain to discover the nest. The old bird sits very closely, and will often allow several stones to be thrown up and the tree to be shaken violently before leaving the nest. The eggs vary in number from three to four. One or two of my specimens show a great deal of white.

“August 5th. A nest containing 4 fresh eggs.

„ 14th.	„	3	”
„ ”	”	3	young birds about 10 days old.
„ 18th.	„	3	fresh eggs.
„ 30th.	„	4	”

“The nest taken on the 30th was built by the same pair of birds whose nest was robbed on the 5th inst., and it was built on a tree only about 350 yards from the first nest. In one or two nests there was a scanty lining of dry grass.”

Captain J. H. Yule has favoured me with the following interesting note on this species:—“About Poona they are very common, and I give you the dates of the nests I have taken this year, since I began collecting:—

“ February 2nd.	4 young.
June 16th.	4 eggs.
„ 21st.	4 eggs.
July 1st.	1 egg.
„ 3rd.	Nest, but did not get up to it, bird sitting.
„ 14th.	1 egg.
„ 19th.	4 eggs out of nest. I took one on the 1st.
„ 29th.	Young.
August 17th.	2 nests, 4 eggs each.
Sept. 4th.	3 eggs.
Oct. 10th.	5 eggs.

“The nests were rather loosely made, lined with dry grass, and placed generally on a thin branch, from 12 to 20 feet from the ground.

“They were nearly all on babool-trees, two or three on another thorny tree in thin jungle, and one on a small mango-tree. In most cases the eggs could be seen through the nest from below.”

Mr. J. Davidson writes from the Sholapoor District:—“It may perhaps interest you or some of your readers to know that *E. caeruleus* bred here twice this season. The bird used to be a rare one in the district, but since the famine a very great deal of land has returned to its pristine condition, and this little Kite is now the commonest bird of prey. In April, when I came back here, I found

pairs all over the district, several accompanied with young. I also found several nests then with nearly full-fledged young.

"In June the birds again commenced to build, and the eggs appear to have been laid as a rule during the last week of that month. I was unluckily detained in a place where there are no Kites for the fortnight from June 28th to July 10th, but I have seen at least 25 nests, mostly with young, almost all along the sides of a nullah on small babool-trees, 15 feet or so from the ground. The eggs or young were almost invariably four, and the former varied much. One nest contained three highly-coloured ones and a nearly pure white one which might have passed for a miniature egg of *H. indus*. Another nest contained two fresh eggs which were exactly like small ones of *A. nisus*."

And he subsequently added:—"I wrote to 'Stray Feathers' about the way *E. caeruleus* has invaded the district, and its breeding in the hot weather, and again in the rains (June and July); but now I got a nest yesterday (September 21st) with a fresh egg, evidently the produce of a pair whose nest I knew, and whose young were sitting on an adjoining tree barely able to take care of themselves."

And again he wrote with Mr. Wenden from the Deccan:—"Moderately common. A nest with three eggs taken on 10th July, 1875. It breeds abundantly in Caladgi District, some 50 miles from Sholapoor, in December."

In Ceylon, according to Colonel Legge, this Kite breeds from December to March.

Taking a large series of these eggs, they vary very much as those of *Neophron ginginianus* do. Typically the ground-colour is a sort of yellowish or brownish white, and the whole egg is so thickly streaked, smeared, and clouded with brownish red of a duller or brighter shade that but little of the ground-colour is visible, and generally at one end or the other, usually the large end, the markings are denser, confluent, and redder than elsewhere. In a certain number of specimens the ground-colour is whiter, and on one half of the egg the mottled blotches are thinner set, and show a good deal of the ground through. I have one egg with one half, the small end, densely blotched with blood-red, only here and there brown, the other half pure spotless white. Again, I have one egg entirely white, with only a zone of sparsely-set markings round the middle. The shell is rather fine and smooth, the surface-pittings are scarcely visible to the naked eye, but the eggs are quite glossy. Held up against the light the shell, where free from blotches, is a very pale yellowish-green.

In shape the eggs are very uniform moderately broad ovals, often, but not always, slightly pointed towards the small end.

All the eggs are nearly the same size; they vary from 1.42 to 1.68 inch in length, and from 1.14 to 1.27 inch in breadth; but the average of a large number is 1.53 by 1.21 inch.

**Pernis ptilorhynchus (Temm.). The Crested Honey-Buzzard.**

*Pernis cristata, Cuv., Jerd. B. Ind. i, p. 108.*

*Pernis ptilorhynchus (Temm.), Hume, Rough Draft N. & E. no. 57.*

The Crested Honey-Buzzard breeds throughout the plains in well-wooded and watered districts, but except in the Sub-Himalayan tracts, such as the northern portions of Bijnour, Bareilly, Saharunpoor, the Doon, &c., its nests are few and far between.

It lays in May and June, and in the latter and former halves, respectively, of April and July. It builds in trees, placing its moderately-sized stick-and-twigs nest in a fork, usually some considerable height from the ground. In texture the nests differ much some are compactly and neatly, others loosely and carelessly, put together, but all are more or less thickly lined with leaves or occasionally grass. As a rule, they lay two eggs, but it is not uncommon to find a single, fully incubated, egg.

I owe to Colonel G. F. L. Marshall the following interesting note on the nidification of this species in the Saharunpoor District, which renders further remarks of my own on the subject unnecessary:—"The Crested Honey-Buzzard builds in May, the young being usually hatched in the beginning of June. The season for building is, however, spread over a long period, as in one case I noticed a bird building on the 23rd March; the nest was completed by the end of April, but the first egg was not laid till the 12th May, and the second egg on the 14th; I took the nest on the 15th.

"The nest is situated in the stout fork of a tree, generally about two-thirds of the way up; of the ten nests I have taken, one was in a toon-tree (*Cedrela toona*) and all the rest in sheeshum-trees (*Dalbergia sissoo*). The nest is cup-shaped in the first instance, but so filled up with the lining as to appear more like a flat platform. It is a compact structure, composed entirely of twigs, neatly put together and lined with a thick layer of dead leaves, chiefly sheeshum-leaves, almost filling up the hollow space; in one instance I found the nest lined with perfectly fresh green leaves, and as there were two eggs in it, the lining must have been partially renewed after the eggs were laid. The outer diameter of the nest is about 16 to 18 inches, and of the egg-receptacle about 10 inches; the depth of the structure, including lining, is about 9 inches.

"The eggs, two in number, are deposited in the middle of the platform; the colour varies greatly, from a white ground, more or less blotched with every shade of reddish brown, to a reddish-brown ground, clouded and blotched with a darker shade. Some are exactly like gigantic Falcon's eggs, while others again closely resemble richly blotched Kite's eggs; in shape they are mostly very round. The shell is thin and rather brittle, and smoother than is usual among the Raptore.

"The bird is rather familiar in its habits, and by no means shy; I took three of its nests, from compounds in the station of Saharunpoor, and three more from the compounds of the canal chokies. It seldom flies far and is easily approached. When the eggs are

near the hatching point, the bird sits excessively close ; I have found it impossible to drive it off by throwing stones, and on one occasion the female only flew when my hand was actually on the nest, though she had been struck pretty sharply by several of the stones. The male bird assists in building, and is more wary than the female.

“ On one occasion I noticed a male bird with a stick in its claws fly into a tree and return without it. I went up to the place, and noticed the commencement of the nest ; while I was standing there the male bird returned with another twig, but catching sight of me from the distance, he turned off and went into another tree some distance off, and nothing would induce him to come near the place till I was well away, though the female kept going and coming all the time.”

Mr. W. Blewitt says :—“ We found one nest of this species near Hansie on the 16th June, which contained a single fresh egg. The nest was placed on a neem-tree, at the height of about 16 feet from the ground, and was slightly built of keekur and zizyphus twigs and scantily lined with reed-grass. It measured 10 inches in diameter and 4 in depth.”

In another letter, also from Hansie, he remarks :—“ We got two nests of the Honey-Buzzard on the 5th and 10th July out of sheeshum-trees on the canal-banks. One contained a single, fresh, the other a solitary fully incubated, egg. The nests were respectively about 15 and 20 feet from the ground, were constructed of keekur and sheeshum twigs, and were lined with leaves.”

Mr. R. Thompson, writing from Gurhwal, remarks that “ the Honey-Buzzard breeds from April to June, building its circular pan-shaped nest (which no little resembles that of *Spizaetus limnaetus*) in large trees, in open forest country.”

Messrs. Davidson and Wenden write from the Deccan :—“ Rarish about Sholapoor. Saw a pair breeding on the 6th February. They were very noisy.”

Normally, the shape of the eggs of this species is nearly spherical, and even the most aberrant are very broad ovals. Typically, they are very highly coloured eggs, and remind one much of the eggs of the European Honey-Buzzard. The ground-colour varies from white or pinkish-white to buffy-yellow, and the markings from reddish brown to intense blood-red. In one, the markings are a dingy, though deep, purple. In another, the whole egg is buff-brown, faintly but thickly mottled and clouded with yellowish brown. Another egg, with a reddish-brown ground, is entirely capped and thickly mottled over the whole of the rest of the surface with a very dull but deep cinnamon-red, reminding one forcibly of some of the richest-coloured eggs of the *Neophron*. As a rule, these eggs are glossless, but one or two have a trace of gloss about them. The lining, or rather the colour of the egg-shell, when held up against the light, varies from greenish white to dingy yellowish green.

In size the eggs vary from 1.82 to 2.22 inches in length, and from 1.55 to 1.85 inch in breadth ; but the average of ten eggs measured was 2.03 by 1.72 inch.

## Subfamily FALCONINÆ.

**Microhierax cærulescens** (Linn.). *The Red-legged Falconet.*

*Hierax eutolmos*, *Hodgs.*, *Jerd. B. Ind.* i, p. 42.

*Microhierax cærulescens* (Linn.), *Hume*, *Cat.* no. 20.

Major C. T. Bingham found a nest of this small Falcon in Tenasserim. He writes:—"On the 14th April I found a nest of this little Falconet in a hole on the underside of a decayed bough of a mighty pymma-tree (*Lagerstrœmia flos reginæ*).

"I had noticed the bird about the neighbouring trees for two or three days successively, and on the date above mentioned saw her entering the hole in question.

"On my sending up a servant who was with me, she flew out and perched on a low tree some thirty yards off; keeping my eye on her, I desired the man to enlarge the entrance of the hole and ascertain whether there were any eggs. In about ten minutes he announced that there were four. I then shot the bird, which proved to be a female. The eggs are broad ovals, dirty whitish yellow, and stained by resting on the broken leaves, wings of dragon-flies, and bits of wood which composed the nest. I don't think the hole was made by the little Falcon, but was probably an old nest belonging to a Barbet. The branch in which it was excavated was about 30 feet from the ground."

The eggs are regular, moderately elongated ovals. The shell is very thin and fairly close in texture, but has no appreciable gloss. The original colour, as I ascertained by carefully washing a part of one egg, is a dead white, but the eggs as found were all suffused with a dirty yellow tint, such as is often the case with the very similar eggs of *Centrococcyx* and *Taccocua*. Held up against the light, the shell appears a very slightly yellowish white.

The eggs vary from 1·1 to 1·3 in length, and from 0·85 to 0·88 in breadth. They are equally unlike eggs of *Fulco*, *Astur*, and *Circus*. I know no Raptorial bird that lays at all similar eggs. As to size and shape, I can match them exactly with large eggs of *Cyanops franklini*, or small ones of *M. marshallorum*, but the texture is different; as regards texture and tint of discolouration, I can match them exactly with some eggs of *Taccoeua affinis*.

**Microhierax fringillarius** (Drap.). *The Black-legged Falconet.*

*Microhierax fringillarius* (Drap.), *Hume*, *Cat.* no. 20 ter.

In regard to this Falconet I quote a note of Mr. Davison's:—"On the 10th or 11th of March, while passing through an old tounyah (clearing) I saw a Falconet of the above species fly into

a hole in a dry tree ; on sending a man up he reported the hole to be empty.

“ On the 25th of March, happening to pass this tree, I saw the Falconet fly out and settle on an adjoining tree, where I shot it. I then sent a man up, and while he was examining the hole the other Falconet, which proved to be the female, flew out and settled close by, and I also shot her. On enlarging the hole sufficiently to admit a man’s hand, it was found that there were no eggs, but at the bottom of the hole, which was about 18 inches deep, was a soft pad composed of flies and butterflies’ wings, mixed with small pieces of rotten wood. On dissecting the female I found in her a fully-formed hard-shelled egg, but unfortunately broken by the shot. This egg was pure white, without spot or streak of any kind, the texture was fine and close, and when held up against the light it exhibited a *very* faint yellowish or greenish hue.”

This, I may mention, was near Bankasoon at the extreme south of Tenasserim. It will be noticed that both this species and *M. caerulescens* breed in holes in trees, line the bottom with a pad of the wings of Lepidoptera, Neuroptera, and the like, and lay white eggs.

**Falco peregrinator**, Sundev. *The Shaheen Falcon.*

*Falco peregrinator*, Sundev., *Jerd. B. Ind.* i, p. 25; *Hume, Rough Draft N. & E.* no. 9.

The only egg of this species—the true Shaheen—that I possess, or indeed have seen, was procured by Mr. Robert Blewitt on the 25th January in the Raipoor district. It measured exactly 2 inches in length by 1·43 inch in width. It was therefore comparatively (for the genus) a very narrow oval egg. It was like a very pale Jugger or Peregrine egg. A pale pink ground, with here and there very faint traces of pale purple clouds, very finely speckled and spotted with deep reddish brown, the specks being comparatively few and very minute over the small end, and somewhat larger and much more numerous over the large end, where they are somewhat blurred and more or less connected with each other by irregular smears of a somewhat paler brownish red.

Dr. Jerdon mentions that the present species breeds on steep and inaccessible cliffs, and that he has seen three eyries—one on the Nilghiris, another at the celebrated hill-fort of Antoor, and the third at the great waterfall at Mhow. It lays its eggs, he remarks, in March and April, and the young fly in May and June, when they are caught by falconers \*.

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\* The Peregrine (*Falco peregrinus*) is said to have been found breeding in Ceylon by Layard; and Colonel Biidulph assures us that it breeds in the neighbourhood of Gilgit at about 6000 feet on the face of precipices.—En.

*Falco atriceps*, Hume. *The Black-cap Falcon.**Falco atriceps*, Hume; Hume, *Rough Draft N. & E.* no. 9 bis.

To my late friend Major Cock, then of Dhurmsala, I owed the first eggs of the Black-cap Falcon that I obtained. He sent them to me, together with the female bird. He gives a most interesting account of his operations. He found the nest on a ledge of rock, on the face of a most dangerous precipice. The nest had for many years been occupied by the Black-cap, but in 1868 a Roc, *G. himalayensis*, laid there, and had to surrender its eggs to Major Cock. In 1869 the Falcons again took possession, and on the 10th of March this gentleman visited it. "I went," he says, "to the Falcon's nest, and found the female sitting close; with great difficulty I got her off, by throwing stones down from above; but even then she did not fly, but only shifted her position on the ledge so as to show me two eggs in the nest. I got men and ropes, and a friend, Captain Duff, to try and shoot her as she left the nest; but though I, with great difficulty, induced a man to descend and take the eggs (after I had all but gone over the precipice myself, a tuft of grass having given way under my foot at the very verge), the female got off scathless, or but slightly wounded, owing to the height of the precipice. Captain Duff, who has a house hard by, tells me that the birds are always killing the Blue Rock-Pigeons under his very nose. Both birds showed themselves, but neither came sufficiently within shot to enable us to bag them, though we fired at the female." On the 17th March he returned to the nest, where the female was again sitting; on driving her off, he saw that another egg had been laid, and he again fired at the old bird, but, owing to the hazardous position in which he was standing at the time, again missed her. On the 20th he re-visited the eyrie. "I was sitting under the cliff when a Lammergeyer came sailing by, and the male Falcon dashed at him, and then returned to the nest, the female flying out in pursuit. As she returned, I shot her; the male then sat on the egg (there was still only one) for some time, when, by sending a man up above to throw down stones, he (the Falcon, *not* the man) flew off, and I got a shot at and wounded him. He managed to get on to a tree overhanging the precipice, and though I got as near to him as I could, and took a pot shot, he was too far off and sailed away down the *khud* (valley)." Subsequently Major Cock took the third egg.

The extraordinary boldness exhibited by the female bird is very characteristic.

The nest, as may be guessed from its age, and from having once at least served our large Himalayan Vulture as a laying-place, was a large irregular mass of sticks. Two eggs were taken the first, and one the second time; but probably the normal number is four. Two of these eggs, which I saw, were very beautiful; broad, very perfect ovals, slightly larger than the eggs of *F. jugger*, and with

shells of a somewhat finer and closer texture than those of these latter. The ground-colour in both was a rich brick-red, here and there faintly blotched and spotted with a darker shade, and with a few bold blotches and splashes, specks and spots of the deepest liver-colour; strange to say, there were one or two pure white spots on the ground-colour, and a white spot or blotch in the middle of almost every one of the larger liver-coloured blotches. In my whole series of the eggs of *F. jugger*, I have none at all like these, although the eggs of both species are emphatically of the true Falcon type. The eggs appear to me fully as big as the average run of eggs of Peregrines.

They measure 2·1 inches in length, by 1·66 and 1·68 inch in breadth.

Three more eggs of this species, obtained, the one on the 6th February from a nest in a precipice near Delt in Kooloo, and the two others on the 3rd of the same month from a similarly situated nest near Nitta, also in Kooloo, differed from the eggs already described, as the eggs of all Falcons will differ *inter se*. The single egg had a dingy brownish-yellow ground, speckled, smeared, and freckled over large portions of its surface with dingy, burnt-umber markings; a dirty washed-out-looking egg, such as is not uncommon amongst Neophrons, but is less seldom seen in Falcons. The other two were richly coloured: the one had a bright, brick-dust-red ground, moderately thinly streaked, mottled, and blotched with blood-red everywhere except at the large end; the other had a dull pink ground, thinly speckled, spotted, and blotched all over with dark reddish brown; just towards the small end the blotches are very thick and numerous, forming a small mottled cap.

These eggs measured, respectively, 1·98 by 1·63 inch, 1·95 by 1·60 inch, and 1·94 by 1·62 inch.

Colonel Radcliffe says that "both this species and *F. babylonicus* breed in the rocks in the hills surrounding our hut encampment, near Kalabagh, chiefly towards the north and west. Many, I am told, breed in and about the Khyber Pass and the mountains of Afghanistan. Certain breeding-places are well known to the Native Chiefs, from which they obtain the young hawks for training every year."

***Falco jugger*, J. E. Gray. *The Luggar Falcon.***

*Falco jugger*, Gray, *Jerd. B. Ind.* i., p. 30; *Hume, Rough Draft N. & E.* no. 11.

The Luggar Falcon lays during January, February, and March, but the majority appear to lay in the early part of February. I have never obtained an egg earlier than the 6th of January, or later than the 30th March. The situation of the nest varies; it is sometimes on large trees, the peepul being perhaps the favourite in the Duab, and sometimes on ledges or in recesses of rocky or earthen cliffs, and sometimes in the face of ancient ramparts where

one or two stones have disappeared, or on more or less inaccessible cornices of ruined buildings. I found a nest in the exterior walls of Togluck Shah's grand Egyptian-looking mausoleum, another in one of the lateral walls of the high gate of Futtehpooor Sikri. I have taken them times without number on ledges of the clay cliffs of the Jumna and Chumbul in the Etawah District, and I met with one containing three full-fledged young ones on the rocks of the Mata Pahar, overlooking the Sambhur Lake; still in those parts of the country with which I am best acquainted, the North-Western Provinces, Oudh, and the Punjab, I believe the majority breed upon trees. When built on trees, the nest is usually a large and massive one, some 2 feet in diameter, if circular, or if, as is more common, oblong in shape, some 2·5 feet in length by 1·5 feet in breadth, and fully 6 inches in thickness\*. It is composed of twigs and small sticks, at times without any lining, and at times lined with a little grass, or straw, or even leaves. Occasionally, the nest is very much larger than I have described, but it will then generally be found that the bird, instead of building a nest of its own, has taken possession of and repaired one of some other bird. Near Bhureh on the Chumbul, a pair took possession of a nest that for the two previous years had, to my knowledge, been always occupied by a pair of Pallas's Sea-Eagle (*H. leucoryphus*); and Mr. W. Blewitt, who took five nests of this species in January and February, in the neighbourhood of Hansie, remarks that in every case the Falcon had taken possession of, and more or less repaired, a deserted nest of the common Tawny Eagle (*A. vindhiana*). The repaired nests were all on keekur-trees (the favourite *par excellence* of *A. vindhiana*), at heights of from 17 to 24 feet from the ground. Three of these nests contained five eggs, a very unusual number. There was no mistaking either eggs or birds, all of which Mr. Blewitt kindly sent me.

Where the bird selects a recess or ledge in a cliff's face for nesting, a large nest is rarely made, a few handfuls of sticks, just enough to prevent the eggs rolling about, with a few feathers, accidentally or purposely intermingled, is all that is usually met with in such situations; and I have twice taken the eggs laid on the bare earth in a slight depression, without one particle of stick, grass, or feather near them.

Mr. R. Thompson remarks:—"This Falcon breeds on lofty trees; usually on one, with others standing near it, in open cultivated country; even when it is a forest bird, it chooses such parts as are tolerably open, with widely-spreading glades; but habitually it prefers open localities.

"A nest found in open forest-country, south of Lall-dang, in the provinces of Kumaon, on the 5th February, 1868, was up to that date unfinished, though both the Falcons were present. The

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\* It appears to be a general rule with birds that build sometimes on trees and sometimes on rocky ledges that their nests in the former situation are always deeper, more cup-like, and more massive than when in the latter.

male I observed carrying small twigs and roots to the female, who seemed the architect. This nest was begun in a large semel-tree (*Bombax heptaphyllum*), on the forked branch of one of the principal lateral arms, and might have been 40 feet from the ground. The nest was about  $2\frac{1}{2}$  feet in diameter, with the egg-cavity about 10 inches. The inside was lined with small fine roots and bruised dry leaves, evidently such as had been attached to the twigs which composed the body and foundation of the nest. On the 27th March succeeding, the nest was again visited. The Falcons were out at the time, it being about the middle of the day. On a man ascending the tree, both birds quickly appeared, and the male, which appeared an old adult, made the first swoop at the man climbing, passing within a few inches of his head. The female (which appeared not to have cast her nestling-plumage) then followed, making her attacks with more vigour and determination. We found three eggs, one addled, and two a good deal incubated."

The late Mr. A. Anderson wrote that "the Jugger breeds in high trees, in the absence of cliffs, during January and February, laying usually four eggs. In size they are intermediate between those of *F. peregrinus* and *F. islandicus*, and not unlike Hewitson's plate of that bird's egg. I have never seen this Falcon build *its own nest on trees*, but have invariably found it take possession of the old nests of *Gyps bengalensis*, or of *Milvus govinda*. Generally speaking, it is not even re-lined; but it is worth mentioning that one nest examined in my presence, in which the eggs were tolerably well incubated, was comfortably and warmly lined with several handfuls of small feathers."

He subsequently wrote:—"In allusion to my former notes regarding this Falcon taking possession of old nests of *Gyps bengalensis*, *Milvus govinda*, &c., I may mention that my friend Mr. Spry, on the 15th January, took an egg of *F. jugger* from the nest of *O. calvus*, flushing the Vulture off her nest. I have only once taken *five* eggs of this Falcon, and on this occasion the bird had selected a ledge in a high mud-cliff which overlooked the Ganges. Within 2 or 3 feet of the head of the sitting bird was suspended the nest of *Arachnechthra asiatica*, which contained two eggs."

I once noticed a curious trait in this bird. On the 2nd of March, 1866, near Soj, in the Mynpoorie district, I found a nest of these birds on what had been a large peepul-tree, but which, owing to the continual cutting of its branches for the elephants of the Chohan Rajahs of the neighbourhood, had become a gaunt, white, spectre-like thing with two or three huge nearly bare arms, each with a dense cluster of leafy twigs near the extremity, and smaller similar clusters at odd angles of the branches. The tree stood solitary in the midst of a wide tract of land overflowed during the rains, but at the time I speak of waste and parched, with no other vegetation for a good mile in any direction but patches of down-trodden, withered rush. The nest was in one of the highest clusters. The male was sitting on the broad bare

bough, about 6 feet below it, tearing a Roller (*Coracias indica*) to pieces ; and I may mention that, when examined, this bird proved to have had the whole head, neck, and upper part of the body eaten ; the wings, tail, and lower portion of the body were altogether uninjured. I shot the male, and he fell flat on the bough. A man was sent up, who threw the male down ; still there were no signs of the female, and I called to the man to search the nest for eggs. As he placed his hand at the side of the nest, which he could only just reach, the female suddenly appeared from the hollow of the nest, and stood upon its margin. The man drew back rather startled, the female turned towards the inside of the nest, gave a vicious drive at it with her bill, and flew off. Oh taking the eggs, it appeared that she had driven her powerful bill into one of them, making a triangular hole, each side of which measured about  $\frac{1}{2}$  inch. The female must have seen her mate shot, and have felt, perhaps from the man still coming to the nest after securing the male, that he intended to rob it. Did she break the egg herself in anger ? The eggs were nearly ready to hatch off. Had she, perchance, some glimmering idea that she might let the chick out and thus save it ? It is impossible to say ; but a whole party of us witnessed the fact, and it seems worthy of record. What struck me fully as much in this case was that, though the male was in the act of tearing the Roller to pieces, and though the whole ground for many yards round the tree was strewed with feathers of Pigeons, Doves, and Rollers, a pair of Doves (*T. risoria*) had a nest with young ones in another leafy cluster of this same tree, and another pair were sitting calmly on two bare sprays, not 15 feet from where the male, whom they could not help seeing, was devouring his prey. Had the Roller always been his prey, one might have understood their fearlessness ; but around the tree lay the feathers of, I should say, at least fifty individuals of their own species. That the Falcons must *designedly* have spared their fellow-tenants is clear ; the two birds, however wary and watchful, could never have built their nest, hatched their young, and partly reared these latter in safety, within 30 feet of the Falcon's nest, unless these latter had allowed them to do so absolutely without molestation ; for, had one of the pair only once been set upon or pursued, they would assuredly have deserted the nest. The natives declared that this pair of Doves were left by the Falcon as decoys, and that the other pair were strangers, who would probably soon have fallen victims to the confidence engendered by seeing the resident birds rearing their young in security.

Colonel Delmé Radcliffe, however, tells me that "it is always the case with the larger Falcons that their fellow-tenants of a rock or a tree are safe from molestation, and in the breeding-season actually look to them for protection. As an exemplification of this I may mention the following :—At the two longitudinally separated ends of the Isle of Wight are two Falcons' nests (*F. peregrinus*), one at the Culvers, the other at Freshwater. In the

neighbourhood of the nest, in each case, innumerable Sea-fowl, Kestrels, Jackdaws, &c., breed peacefully, while the Falcon's nest contains evidence that these same species form their young ones' food. But the going out and coming in of the Falcons causes no alarm among the tenants of the face of the cliff for 6 miles or more. I have seen them skimming about under a Falcon, in a position to stoop, apparently in the most tempting and enticing manner. But let a Falcon from the other end of the Island appear, and a scream of alarm from thousands of tenements brings out Falcon and Tiercel, and the clamour subsides as they swoop away over the sea to thrash the stranger, sometimes for miles, and on their return no ornithologist, not on the look-out, would be aware that a Falcon was approaching. The same is the case with all Hawks that have taken up their abode at a place. I kept a Shaheen at hack here for some time, but I never knew, while sitting in my house, by any commotion among my neighbours' Pigeons and the Crows, &c., which inhabit the neighbourhood, when my own Falcon was going out or coming home, at least after she had been at liberty for a week, while I always had instant notice of the approach of a wild Peregrine or Shaheen."

Mr. Scrope Doig writes from Sind:—"Found over a dozen nests of this species between the 10th and 26th February. They were all, with one exception, built on tombs situated out on the bare plains. The one exception was when the nest was built in the fork of a pollarded kundy tree."

Colonel E. A. Butler remarks:—"I took a nest of the Luggar Falcon near Deesa on the 24th March, containing three fully-fledged young birds. It was placed on the top of a tree about 30 feet from the ground, and as usual consisted of a good-sized structure of dead sticks. One of the old birds invariably sat on the tree close to the nest, keeping guard whilst the other was away hunting for food, dashing at any bird of any size that ventured within a radius of about 200 yards. Most of these birds breed with us in January and February."

He continues:—"Feb. 7th, 1878, visited a nest on the church-steeple, Karachi, and took two fresh eggs. The nest was built on one of the ledges of the tower, about 40 feet from the summit, with the lightning-conductor running through the centre of it to prevent its being blown away by the high winds, and having been used for many years, and annually renewed, was an immense stick-structure as large as a Kite's nest.

"On the 23rd idem I revisited it, and took another fresh egg. The birds then took possession of a Kite's nest on the station flagstaff, about 200 yards off, and laid two more eggs, which I also secured. On the 24th idem I took three slightly-incubated eggs from another nest in the same neighbourhood, built on a ledge on the side of a low cliff about 30 feet from the ground, and within arm's reach of the top of the cliff. I found one or two other nests during the same month, one on the church at Hydrabad, and another on a tree in the same neighbourhood."

Messrs. Davidson and Wenden, writing of the Deccan, say:—  
“Found first nest, with one fresh egg, on 4th January, and last,  
with three almost fresh eggs, on 14th March.

“On the last nest, built in a neem-tree, about 12 feet high, the male bird was sitting, while the female was perched on another tree 100 yards away.”

Mr. J. C. Parker notes:—“Three fresh eggs were taken from what appeared to be a Vulture’s nest in a peepul-tree close to Calcutta on the 18th January, 1874. Another nest was found on the 23rd idem high up on a Casuarina-tree in the Magistrate’s compound, Dum Dum, containing three fresh eggs. The man who was sent up had a regular battle with the female, striking her repeatedly on the head with a stick before he could induce her to quit the nest.”

The normal number of eggs is four; but while five are occasionally found, the bird often sits on only three; and once I took two eggs, ready to hatch off, out of a very old pair’s nest, that in former seasons had always contained the full number. In colour the eggs vary much, as indeed do those of all true Falcons. The usual type is a reddish, brownish, or yellowish-brown ground, very thickly speckled and spotted all over with a darker and richer shade of the ground-colour. The spots are often more crowded at one end than the other, producing occasionally the effect of a clouded cap; some, in addition to the multitudinous specks, exhibit bold red blotches, or dark streaky clouds, and some again are very feebly coloured, a nearly uniform pale dingy buff, with scarcely a trace of blotches or even specks of a darker hue. In shape, the eggs are commonly a broad oval, slightly more pointed at one end, of a dull, glossless, and slightly chalky, but still compact texture. The egg-lining is white or slightly reddish white.

Elsewhere I have thus described the eggs:—“No very great variation in shape is observable in the eggs of the species. They are all a somewhat broad, but generally very perfect oval. In texture they are rather fine, but at the same time (if I may so express it) chalky, and they are perfectly devoid of gloss. The eggs, as a rule, are a longer oval than those of *Falco peregrinus*, and are scarcely ever so richly coloured as the latter often are. The coloration is, of course, of the true Falcon type. Some eggs are of a nearly uniform pale dingy yellowish brown, blanching towards one extremity or the other, indistinctly clouded, blotched, or mottled with a somewhat deeper and redder brown. Others are a nearly uniform red-brown, with scarcely any traces of distinct markings; others have a nearly pure white, reddish-white, pale dingy yellow, brownish-yellow, or reddish-brown ground, more or less boldly, extensively, and thickly blotched and clouded, or even freckled, mottled, and streaked with more or less bright or deep, brick- or blood-red. As a rule, the markings are not very bold or sharply defined; in but few is there any decided tendency towards capping at either end, and all have a more or less freckled and dotted appearance. These eggs fade much as time passes,

but when first found many of them are, to an oologist's eye, perfect pictures."

In size they vary from 1.85 to 2.15 inches in length, and from 1.48 to 1.65 inch in breadth; but of ninety-eight eggs measured the average size was 2.01 by 1.57 inch.

***Falco chicquera*, Daud. *The Red-headed Merlin.***

*Hypotriorchis chicquera* (*Daud.*), *Jerd. B. Ind.* i, p. 36.  
*Chicquera typus*, *Bp.*, *Hume, Rough Draft N. & E.* no. 16.

The Toorumtee or Red-headed Merlin breeds from January to May, the majority, I think, laying in March. I have myself as yet obtained no egg earlier than the 15th February, or later than the 15th of May; and all those obtained in May were from the Punjab, where many birds breed later than in more southern parts of the country.

They nest, I believe, exclusively on trees. I have seen no record of their building on rocks, as so many of the Falcons often do; and I once took a nest in the Sewaliks in a peepul-tree, at the foot of a cliff, full of ledges and boulder-holes, which, had the bird any sort of inclination for such localities, would have been sure to have attracted it.

Where such occur, they prefer large trees—peepul, mango, and tamarind (more commonly the two latter), usually selecting one of a small group standing by itself. In the Punjab and Rajpootana, where large trees are scarce, their nests may be found on mere bushes, not above 10 feet from the ground.

The nest is generally firmly fixed in a fork near the top of the tree, and is typically a very neat, compact, and characteristic structure; it is usually circular, some 12 inches in diameter, and from 6 to 9 inches in thickness, with a deep egg-cavity, from 5 to 6 inches in diameter, and from 3 to 3.5 in depth; but I have seen some nests, comparatively thin platforms, with only a depression of 1.5 to 2 inches in depth towards the centre. The lower portion of the nest is constructed of pretty stout twigs, of various kinds of wood, closely put together; the upper portion of finer twigs still more closely interwoven. The egg-cavity or depression is lined with fine roots or vegetable fibre, the roots of the khus grass (*Andropogon muricatum*) being commonly chosen for this purpose, along with straw, a few feathers, and occasionally a shred or two of cloth, the lining being firmly intertwined with the twigs forming the walls of the cavity.

These birds make, I think, their own nests fresh and fresh every year. I have repeatedly seen them building new nests in trees containing very nice last year's nests of Crows and other birds, and though I have very often looked them up again, I have not as yet ever found a nest tenanted by the Toorumtee during two successive seasons. Both sexes assist in building, and they make no little fuss about the placing of each twig that is brought up. The

normal number of the eggs is four ; but I have found the female sitting on only three. Two nests, each containing five eggs, have been reported to me ; but these are very exceptional.

Mr. William Blewitt mentions taking several nests of this bird, which at Hansie is known as the *Koohee* (a name elsewhere applied to the Shaheen), in March, April, and May. The nests were placed on peepul and jhand trees, at heights of from 10 to 24 feet from the ground ; most of them were scantily and loosely, but one or two densely and compactly, constructed of fine babool and other twigs, lined with fine straw, feathers, and a few rags, and measured from 8 to 10 inches in diameter, with a cavity from 2 to 3 inches deep. None contained more than four, and one had only three, much incubated, eggs.

The late Mr. Anderson remarked that it "breeds generally in February and March. The few nests discovered by me, I attribute solely to the fuss made by these little Falcons, as they are most pugnacious and noisy during the breeding-season, actually attacking Kites and Crows at a considerable distance from the tree they have monopolized. On two occasions my tent happened to be pitched in a mango-tope, where a pair of Toorumtees were busy building, and I found them a perfect nuisance, as they were incessantly darting out and driving away all manner of imaginary enemies. The nest is generally placed in a leafy clump near the top of a tree (by preference the mango), and it is by no means easy of detection. Four is the usual complement of eggs they lay ; and in size and appearance some in my collection would easily do duty for those of *Falco subbuteo* as figured by Hewitson. On the whole, there appears to be the same relation between the eggs of this bird and of the Jugger Falcon, as there is between the eggs of the Peregrine and the Kestrel.

" Mr. Hume states that he has as yet obtained no egg earlier than the 15th of February. It is, indeed, strange that the only three nests taken by me were *all* before that date, one of them actually as early as the 9th of January last. One of these deserves special notice. I was returning home late on the evening of the 4th of February last, when my attention was attracted by the familiar cry of one of these birds, which I found was attacking a common Kite in the most furious manner, at a considerable height in the air. The only tree for a mile round was a gigantic solitary mango ; and no sooner had I sent my man up the tree, than the little Falcon flew straight to her nest, quite prepared to hold her ground. The nest contained two fresh eggs ; but one of them had a largish hole on one side, exactly like what would be made by the beak of a bird ; and through this aperture I blew the specimen. I imagine the Toorumtee had done this from anger, when it saw that the nest was about to be robbed."

Colonel E. A. Butler writes :—" I found a nest of the Red-headed Merlin near Deesa on the 23rd March, containing four young birds about three weeks old, so that the eggs must have been laid about the end of the first week in February. The nest

from which I took the young ones above mentioned was of considerable size, made of dead sticks and placed at the top and near the centre of a tall tree about 50 feet from the ground. The parent birds evinced great anxiety whilst the nest was being robbed, flying round and round the tree uttering their shrill Kestrel-like note. Another nest, similar in structure and in an exactly similar situation, near Deesa, 16th April, containing four young birds almost ready to fly.

“ Belgaum District, March 1880, three fresh eggs.”

Major C. T. Bingham, writing from Delhi, says:—“ On the 27th March I found a nest of this bird, placed on a tall slender babool-tree close to a pathway leading from one of the gates of Delhi.”

Mr. Benjamin Aitken sends the following note:—“ This note should be an important addition to your ‘ Rough Draft,’ for I have to record an instance of a pair of Tooruntees building in an old nest, though whether their own or a Crow’s, I am unable to say. The nest was in the topmost twigs on one side of a very large tamarind-tree at Akola, Berar. The birds took possession of the nest early in September 1869, and guarded it jealously for five months, often getting into the nest and allowing neither Crow nor Kite to approach the tree. In February 1870, the female bird seemed to be oftener in the nest than usual, though I had almost given up watching them. On the 18th of the month a man went up and found four young birds in the nest covered with down. They were not disturbed, and left the nest when fully feathered.

“ I may say that this nest was in our own compound, and that I saw the birds every day from September to February. They were rarely away from the nest, always perching on the twigs within a foot or two of it, and brought all their prey and ate it there.”

Mr. J. Aitken, writing from Akola, says:—“ I see that you say that in Upper India the Tooruntee usually builds its own nest. In this neighbourhood, however, they more commonly select the old nest of a Crow.”

And Messrs. Davidson and Wenden write from the Deccan:—“ Very common, breeding abundantly all over the districts. First nest observed on 28th February, and the last 28th March. Four nests, each contained three fresh eggs. Some birds certainly breed prior to the first date.”

The eggs vary somewhat in shape, but are generally, I think, much like those of a common hen, though perhaps slightly narrower and of course much smaller. In colour, they vary from very pale yellowish brown, with just a few reddish-brown specks, to a nearly uniform dark brownish red, obscurely mottled and blotched with a somewhat purer and darker red; typically they may be said to have a reddish-white ground, so thickly freckled and speckled with dull brownish red as to leave but little of the ground-colour visible. Often they have a sort of ring of more or less feeble blotches near the large end, and at times a zone of

rather higher colour than the rest of the egg near the middle. The eggs are normally a long oval, and, with the exception of shape, which is invariably less round than those of that species, the eggs of the Toorumtee are perfect miniatures of the Luggar's. As far as colouring goes, every egg of the former, in my collection, can be matched by some one of the latter's that I possess. In size and colouring they remind us not a little of the eggs of the Merlin; but, as a rule, they are somewhat narrower than these, and a greater number of them belong to the dingy, yellowish brown, Falcon type, and fewer to the deep red type.

In length they vary from 1.6 to 1.75 inch, and in breadth from 1.20 to 1.33 inch; but the average of forty-four eggs measured was 1.66 by 1.27 inch.

**Tinnunculus alaudarius (Linn.). *The Kestrel.***

*Tinnunculus alaudarius (Linn.)*, *Jerd. B. Ind.* i, p. 38; *Hume, Rough Draft N. & E.* no. 17.

The Kestrel, I have now ascertained, breeds throughout the Himalayas from Afghanistan to Sikkim, in the Sulliman range, and the hills that divide Sindh from Khelat, and in the Nilghiris. In the Himalayas it lays in April, May, and June; in the Nilghiris it lays as early as the last week in February, in March, and April.

The nest is almost invariably placed on rocky ledges or small holes in cliffs; but I have well-authenticated accounts of its nest having been taken in ruined buildings both in Cashmere and Kumaon, and even in a tree in Murree. In the Himalayas its nest is seldom found (so far as my experience extends) below 7000 feet; but in the Nilghiris it breeds at a somewhat lower elevation, as at Kotagherry and Neddivatam. In the Himalayas some nests may be found up to nearly 10,000 feet; in the Nilghiris they are to be found in suitable places as high as these occur, say 7500 feet.

The full number of eggs varies from three to six; but five is, I think, the usual number.

The nest is round, oblong, or semicircular, according to the shape of the site chosen, and is a thicker or thinner platform from 12 to 20 inches in diameter, and 2 to 6 in thickness, made of small twigs, in which grass, roots, rags, and, as Mr. R. Thompson informs me, at times strips of cloth,  $\frac{1}{2}$  yard in length, are incorporated, and serve as lining.

In one case (a nest I myself found close to Simla) there was very little nest at all—only a few sticks with a little grass, two or three pieces of rags, and a few feathers.

Captain Hutton remarks:—"The Kestrel is very common, both in the outer hills and the Doon; at Mussoorie I have known it to breed upon a lofty ledge of rocks above the Superintendent's offices."

Mr. W. Theobald makes the following remark on the breeding of this bird in the valley of Cashmere :—" Lays in the third week of April ; eggs, six in number, blunt ovato-pyriform ; measuring from 1.51 to 1.68 inch in length, and from 1.22 to 1.27 inch in breadth ; colour, pale reddish brown, freckled and blotched with brownish red. Nest, hole in serai wall of Thanna, south of Blramgaâla, Shahabad, and valley generally."

The late Dr. F. Stoliczka remarked that "*Tinnunculus alaudarius* is common all through the North-western Himalayas, on the southern side as well as in West Tibet. I found this common European Hawk breeding near Chini in narrow crevices of rocks. The eggs are dirty white, mottled and irregularly spotted with reddish brown. The young birds vary extremely in colour of their plumage ; but the old ones are in every way identical with those from Europe."

From Dhurumsala the late Major Cock wrote :—" This bird remains with us all the year round, although it retires higher up the mountain during the month of May. I noticed a pair of birds about a precipice some two or three times, and concluded that they built there. On the 27th of May I went with a rope, and found that there were three young ones, only a few days old, in a niche in the precipice that was overhung with grass, rendering the entrance to the nest difficult to be seen. This nest was on the mountains, at a height of 7000 feet above the sea-level, and I doubt their breeding lower down, though an officer assured me he saw a Kestrel breeding on a cliff on the banks of the Beas in February. I found another nest, at about 8000 feet elevation, on the 27th of May, with one egg in it. I had watched the birds pairing some days before, and with the help of a rope managed to secure the solitary egg. On the 5th of June I sent up a party, who got three more eggs out of this same nest. Two of the eggs, the largest and smallest, measured 1.55 by 1.16 inch and 1.35 by 1.14 inch."

Mr. R. Thompson sends me the following :—" The Kestrel breeds in this country, preferring the shelving of a rock to any other situation. I have seen the nest and young on the precipices of the Sewaliks. A dozen nests might be pointed out on the precipices overhanging the Kossilla river between Khyrna and the Lat Bridge. In the valley here noted, it may be seen breeding in company with the *Neophron*.

" At Pooree, in the interior of Gurhwal, a Kestrel carried off a large piece of a *pugree* belonging to one of my shikarees and took it off to its nest, whence it was recovered by the fellow letting himself down by a rope. I was witness to the whole transaction. At Nynee Tal, two pairs breed yearly ; one on the western precipices, the other on the south-eastern, not far from where I live."

Mr. Thompson remarks that this species is " common during the cold weather in all parts of the Central Provinces. I doubt if these birds leave the mountainous parts of these provinces for breeding purposes, as I have seen couples hanging about near

precipices from April to June, after which I returned to headquarters, and have never found the nests."

Mr. Thompson here refers to the Satpooras, the Meikle Range, &c.

Writing from Murree, Colonel C. H. T. Marshall remarks:—"The Kestrel usually builds in rocks, but we have found a nest about 60 feet up a pine-tree, with five hard-set eggs in it, of a much duller, dirtier brown than usual. This was on the 14th June. The nest was apparently one originally belonging to *Corvus macrorhynchos*."

Major Wardlaw-Ramsay says, writing of Afghanistan, "Breeding in May;" and Lieut. H. E. Barnes informs us that he procured the eggs in that country.

Mr. Benjamin Aitken writes:—"You say of the Kestrel in your 'Nests and Eggs,' 'I am also informed (but do not vouch for the fact) that it breeds near Mahableshwur.'

"I beg, with all deference, to assert that the fact of the Kestrel breeding at Singurh (twelve miles south of Poona, elevation 4162 feet) is as certain as any fact of the kind could be, until you have taken the eggs. I went to Singurh for one day on the 26th May, and at the back of the fort, where there is a sheer descent of cliff of fearful depth, a pair of Kestrels had taken up their station, and were making the air ring with their screams as they pursued Kites, Hawks, and Vultures that appeared in sight. They repeatedly sailed just within a few yards of where I was standing, so that there could be no mistake about the birds, which always returned to the same spot on the face of the cliff about 50 feet below. I had neither men nor ropes, but could the fact of the pair having a nest have been better established by my procuring the eggs or young ones?

"I saw a pair of Kestrels about the cliffs at Khandalla, on the Bhore Ghât, in June 1871, and my brother, E. H. Aitken, observed a pair hanging about the same cliffs last month. I have not personally the slightest doubt that Kestrels in the Deccan and Konkan retire to that part of the Western Ghâts and to all the outlying hills every hot season; and I hope some day to have the time and enterprise to send you eggs taken within a hundred miles of Bombay."

Writing of the Deccan, Messrs. Davidson and Wenden say:—"Common throughout the district in the cold weather, and D. thinks it breeds at Mahableshwur."

Mr. J. Darling, Junior, informs me that he has "twice taken a nest in the neighbourhood of Neddivatam (Nilghiris), at an elevation of about 6500 feet—*first*, on the 21st February, 1869; *secondly*, on the 1st March, 1870. The nest, for it was the same that I robbed in two successive seasons, was placed in a natural hollow on the top of a dead stump, about 14 feet from the ground. It was circular, and composed of a few pieces of sticks, some dry grasses and fibres, and was about 8 inches in diameter, and had a depression about 4 inches deep, which contained four eggs, having

a dirty white ground, speckled and blotched all over with brownish red."

From Kotagherry Miss Cockburn says:—"I have noticed that a pair of these birds appropriate a certain cliff or precipice, and breed there year after year. One pair have thus built on a nearly perpendicular cliff, some hundred feet in height, placing their nest in a small cleft about halfway up. One of the two birds always keeps watch over the nest even before any eggs are laid in it; the nest is inaccessible to ordinary mortals, but last year I sent for a couple of Kurumbas, and they very soon secured both nest and eggs.

"The nest was composed of straws, a very few feathers, and some small pieces of dirty rags, rudely collected together. Its foundation was on a rock, so it needed no other. It was taken on the last day of February. It contained four eggs. Three of the eggs were very much alike, having a dark reddish ground and darker spots; but one was considerably lighter, with large blotches at the smaller end instead of at the larger, as is usually the case."

Mr. Davison tells me that the pertinacity with which these birds return year after year to the same nest is remarkable. At Neddivatam there was a nest that had been robbed for four successive years by Mr. Morgan, in which he again found the Kestrels laying in the fifth year. He says, too, that though this is not always the case, he thinks that after the first set of eggs have been taken, this species, unlike other Falcons, often lays a second time.

Mr. A. G. Cardew adds the following note:—"Breeds on the Nilghiri Hills, January to March."

Major Wardlaw-Ramsay says:—"The Kestrel is very abundant in Karen-nee, where the rocky precipices afford it good nesting-places. It is by no means common in the plains."

The eggs resemble those of *Falco chicquera*, but are smaller, slightly broader, and less uniform in their colour. In shape they are broad ovals, more or less pointed or compressed towards one end. The ground-colour is a darker or lighter brick- or blood-red, blotched, or mottled and freckled with a deeper shade of the same colour, the blotches being in some eggs strongly defined and well marked, and the whole tint of the egg being in some specimens browner and yellower than I have above described. The eggs are glossless, and the shell, though fine and compact, has the sort of chalky texture noticed in the eggs of *F. jugger* and *F. chicquera*.

The eggs vary from 1.46 to 1.65 inch in length, and from 1.13 to 1.30 inch in breadth; the average of nineteen eggs measured being 1.57 by 1.21 inch.

## Family VULTURIDÆ.

*Gyps fulvescens*, Hume. *The Bay Vulture.*

*Gyps fulvescens*, Hume; Hume, *Rough Draft N. & E.* no. 3 bis.

The Bay Vulture breeds, doubtless, all over the drier and more desert portions of Sindh, Rajpootana, the Punjab, the North-west and Central Provinces.

Of its nidification I can say little. Mr. R. Thompson informs me that on the Satpoora range of the Central Provinces it breeds in January and February, building a large platform stick-nest on the lofty sal trees that there abound. So far as my own experience goes, it breeds in February and the first half of March. Its nest, a huge platform of sticks, was placed, in the only three instances which I know of, near the top of a very large peepul (*Ficus religiosa*) tree. Both nests that I found were solitary, as was that found by Colonel C. H. T. Marshall. The nests are between 2·5 and 3 feet in diameter, some 6 to 10 inches in depth, constructed of sticks and twigs, and without any lining. The nests that I found on the 12th and 21st March contained a single young bird each. It is to Colonel Marshall that I owe the only egg I possess. He says:—“The nest was found on the 14th March on the top of a large peepul-tree (some 40 feet from the ground), in the Shah-balouli gardens near Lahore. It contained a single egg nearly ready to hatch off, the bill of the young one being actually protruding.”

The egg is a very perfect oval, a good deal larger than that of *Otrogyps calvus* or *Pseudogyps bengalensis*, and the texture appears to be finer than that of the eggs of any of our other Indian Vultures. No positive conclusion, however, can be arrived at from the examination of a single egg.

The egg is of the usual Vulturine type, pale bluish white, but with a faint gloss; it is altogether unspotted, but was extensively soiled and discoloured from the droppings of the parent bird. It measures 3·5 by 2·8 inches.

Major Bingham more recently found a nest of this Vulture. He says:—“On the 18th March I found a nest of this Vulture placed on a solitary peepul, standing in the middle of a plain not far from the left bank of the Jumna, opposite the village of Wuzeerabad. The nest was a large rough unlined structure of boughs and branches, larger than, but very like that of, *P. bengalensis*. It contained a single hard-set dirty-white egg, which measured 3·78 inches by 2·68 inches. I shot the old female as she moved off the nest.”

**Gyps himalayensis, Hume. The Large Himalayan Vulture.**

*Gyps himalayensis, Hume*; *Hume, Rough Draft N. & E. no. 3; Cat. no. 3 ter.*

The Roc, as I have called our largest Himalayan Vulture (long confounded with *G. fulvus*, Gmel., of Europe and Africa, the well-known Griffon), lays during the last week in December, the whole of January and February, and the first week in March. As a rule, however, by the end of February the nests contain young, huge, gosling-looking creatures, thickly clad in long dingy yellow down.

The nest, where there is one, is ordinarily a huge platform of sticks (at times the property, in past years, of some Eagle or Falcon, which the early nesting Vultures have seized upon long before the rightful owners have even begun to think of their annual matrimonial duties), placed, I believe invariably, on a rocky ledge of some bold precipice in the Himalayas, at least 3000 feet above the sea. At times the whole nest consists of a few twigs or roots, or a little grass, and occasionally the egg reposes on the bare ground. I have never yet heard of their nesting on trees. Though generally gregarious in their breeding-habits, large numbers rarely appear to breed together. Six is the greatest number of nests I have yet known of in one single locality. In this respect they differ from *G. indicus*, of which usually from 10 to 30 pairs breed close alongside each other.

West of Nepal they breed in suitable localities all over the Himalayas; Mr. R. Thompson mentions having seen their nests in the neighbourhood of Nynee Tal. From near Chakrata, an egg has recently been sent to me. My dear friend, Colonel G. F. L. Marshall, nearly lost his life examining a breeding-haunt near Kussowlee. I have seen their nests in many places in the interior, in Gurhwal, Teree, Bussahir, and Kooloo, and I have had the eggs taken behind Mahasoo and near Narkunda. Long ago, the late Major Cock, who probably took more eggs of this species than any one else, wrote to me as follows:—

“In April 1867 I was at a pic-nic in the Kumara slate-quarries (near Dhurumsala), and there noticed a nest of *Gyps fulvus*; the old bird was sitting at the time; the nest was a mass of sticks and dirt, placed on a shelf of rock under an overhanging precipice. Some idea of the magnitude of the precipice I can give you. When standing at the foot I could not nearly fling a stone up to where the nest was, and yet it was more than halfway down from the top. I got long ropes and hill-men, and a venturesome plainsman (hill-men would not look at it) went over. After dangling in mid-air for some time, he contrived to get hold of a creeper with his toes, and by means of that pulled himself on to the ledge; then creeping along the ledge, he got to the nest, and went quite close to it; the Vulture at last flew off, leaving a young one covered with dingy yellow down, and looking like a huge gosling. I left the young one, and took measures for securing the eggs in 1868.

On the 25th February, I went out and saw that this year there were two nests on the ledge. I then, on the 28th February, got long ropes reaching from the top of the precipice to the bottom, and with the aid of a long bamboo, with a bag at the end, we fished the eggs out of the nests; a man having been pulled up from below for that purpose. There was only one egg in each nest." Major Cock found the birds breeding earlier in 1869 than in the previous year. On the 20th February he found four nests; one had an egg, in the other three the old birds were sitting close. Next day, taking ropes and men, he visited the nests. In No. 1, the egg had hatched off; No. 2 contained a young one of some five or six days old; and No. 4, one fully a week old. No. 3 alone contained an egg, and that even would have hatched off probably in another day, and contained a live fully-formed chick.

Later, Major Cock sent me the following further note on the nidification of this species:—"I find that the nests of this bird vary much in their character, some being large masses of sticks, others only a few roots and grass; and, again, the egg is sometimes laid on the dust of some dry, well-sheltered ledge. In all cases there is a shelter for the young by some overhanging ledge. The nests are occasionally close to each other, but very seldom; yet many pairs will be found breeding in one nullah on the steep precipices on either side. The old bird sits very close indeed; on one occasion it was not till I put out my foot towards the old bird that she got off her egg, and then she did not take wing, but only moved some three yards further up, and on my turning round to go back, she immediately returned and sat on the spot where her egg had been placed. I fancy that this bird is the most powerful of all the Vultures. A nest that I was watching, belonging to *Gypaetus barbatus*, was taken possession of by a pair of *G. himalayensis*; they commenced throwing out the wool that had been placed in the nest, and for some days one Vulture at least might always be seen on the nest, and occasionally both. I often saw the Lammergeyers try and effect a lodgment on the nest, but the Vulture on sentry had only to come to the front to drive the Lammergeyer off. This pair of birds were both young birds. I have observed the old and young birds pairing together. In one case, the female was quite a young bird with the stripey brown breast, while the male was the palest of his tribe. The variation in the colour of this bird is considerable, and I do not think they attain their natural pale colour till they are four or five years old. I have not noticed that the coloration of their eggs is influenced in anywise by the age of the parent, as a particularly large grey pair laid a very small egg with the faintest of rusty spots at the larger end. The old and young birds just mentioned laid a large white egg."

The bird lays a single egg; as indeed *all* true Vultures here invariably seem to do.

The eggs of this species are larger than those of any of our other Indian Vultures.

In shape they vary a great deal, as indeed do those of all the Vultures, but they seem to be normally rather long and pointed ovals.

The texture of the shell appears coarser than that of the eggs of either *G. indicus*, *G. fulvescens*, *P. bengalensis*, or *O. calvus*. The ground-colour is the usual greenish or greyish white of all the true Vultures.

Some are entirely devoid of markings, but fully two-thirds are more or less blotched or streaked with brighter or duller shades of red-brown, or with pale brown or olive-brown. Perhaps one in ten are blotched all over, and two in ten have a considerable amount of markings, confluent at one or other end.

In size they vary from 3·58 to 4·08 inches in length, and from 2·38 to 3·1 inches in breadth. The average of twenty-five eggs measured is 3·76 by 2·75 inches.

***Gyps indicus* (Scop.). *The Long-billed Vulture.***

*Gyps indicus* (Scop.), *Jerd. B. Ind.* i, p. 9; *Hume, Cat.* no. 4.

Common as this Vulture is, I have only one note on its nidification. Mr. J. C. Parker writes:—"On the banks of the beautiful lake at Mogra, situated in the extreme N.E. corner of the 24 Pergunnahs, I discovered these birds breeding on the 20th January of this year. The nests were all built on cotton-trees with one exception, and this was on a peepul; the latter was so large and the foliage so dense, that I did not discover it until my second visit to the lake on the 11th February, when it had a young one just hatched in it. In no instance did I observe more than one nest on a tree, and the nests themselves were all of the same construction, made up of boughs broken off fresh, the leaves still adhering but of course quite withered. This circumstance gave the nests a very snug and compact appearance, unlike those of *Pseudogyps bengalensis*, which always have, as far as my experience goes, a considerable quantity of sticks worked into them. I only secured two eggs on this occasion, dirty white in colour and measuring 3·60 by 2·90 and 3·20 by 2·60; the large egg hard-set, the other fresh. I shot both the birds sitting on the nests. One proved to be a male, weighing 13½ lbs.; the other, of which the sex could not be satisfactorily identified, weighed 14½ lbs. As the time left is but short after marching some ten miles as the crow flies from the station at Muddapore, E. B. Ry., to the lake, I was unable to beat up the quarters of a colony of these birds, plainly visible across the lake about two miles off, so had to defer that pleasure until my next visit (11th February). The nests, six in number, were all on cotton-trees, which at this season were naked and bare of leaves. Each nest had a single young one in it a few days old. Doubtless there were many more nests in the neighbourhood, but the trees are all of very large size, so that unless separately examined the nests, in spite of their size, are not easily seen."

The eggs are broad ovals, usually very symmetrical, sometimes slightly pointed towards one end. The shell is very hard and strong, but, compared with that of the eggs of *Gyps pallescens*, rather coarse-grained. They run rather smaller also, I think, than these. The colour is nearly pure white, with just a faint greyish tinge, and very few eggs seem to show markings.

Eight eggs vary from 3·39 to 3·62 in length, and from 2·68 to 2·78 in breadth.

**Gyps pallescens, Hume. *The Pallid Vulture.***

*Gyps indicus (Scop.), apud Hume, Rough Draft N. & E. no. 4.*  
*Gyps pallescens, Hume; Hume, Cat. no. 4 bis.*

Our present species breeds in the latter part of December, January, and possibly the early part of February; by the end of March every egg has been hatched off. It always selects, as far as my experience goes, nearly inaccessible and precipitous cliffs to breed on; but as I have only yet found it breeding in two places, viz., at the Taragurh Hill near Ajmere, and the Gaimookh cliffs on Mount Aboo, I cannot speak positively. Jerdon, however, mentions that the present species breeds on "some of the cliffs bounding the valley, in which are situated the celebrated caves of Ajunta;" and Mr. R. Thompson found their nests on the cliffs of the Puchmurees.

The breeding-places of this species (they appear always to breed in society) are often very picturesquely situated. The Taragurh Hill, which overlooks and almost overhangs the city of Ajmere and the beautiful Ana Sagur Lake, may be about 2900 feet above the level of the sea. On precipitous faces of this hill, especially where succeeding overlapping ledges make the place as nearly inaccessible as may be, colonies of this Vulture breed. One of these breeding-haunts, which I minutely examined, was a cliff-face some 100 feet high by 300 wide, all broken up into irregular ledges, of which the highest overhung all the rest. In amongst the ledges were a few dwarf banyan-trees, whose long bare roots and rootlets hung down, here and there, in dense, grey, giant skeins; all the ledges but the uppermost, when looked at from below, seemed garnished with heavy white fringes, the white droppings of the birds having run down in close parallel lines in a wonderfully symmetrical fashion over the weather-smoothed edges of the terraces. Seen from a distance, the whole cliff-face seemed mottled with huge patches of whitewash. Bleached bones and dusky quills strewed every little plateau, and nestled in every cranny. It was on the 30th of March, 1867, that I laid siege to this natural fortress. With the assistance of two sporting Mahomedan faqeers—two of the best cragsman I ever saw—I crept, having duly removed my boots, to the lowest ledge, a work of extreme difficulty, owing to the excessive slipperiness of the white-crusted rocks. To my intense disgust, a little apart from the nest, on the bare stone, sat a huge unwieldy mass

of yellow fluffy down, opening a vast mouth and cackling and hissing at me in the most hostile manner. The unfortunate little wretch was too fat and heavy to stand firmly on its stumpy legs, and could only stand up for a second, stagger a few inches, and then plump down exhausted. It was about 10 A.M., and all the old ones were away procuring food, and during the two hours we remained about the rocks, only one of them at all closely approached the place, although before we left the whole community—I should say nearly sixty in number—had collected in the valley (in one side of which the cliff was situated), and kept wheeling and circling round above their homes, but at a distance of fully  $\frac{1}{4}$  mile. We left the dingy little tenant of the first nest in peace, and slowly and painfully made our way to one after another of the nest-filled ledges. Everywhere we found the nests empty; but in the case of about half the number, a more or less advanced young one of from a week to more than a month old was squatting on the bare rock a few feet from the nest. Those nests near which no young was seen had obviously not been tenanted. At the time I fancied that these belonged to birds that had not yet laid, but I had the place closely watched for nearly a month without any one of them being used, so that I presume that the birds often find their first nest unsuitable in some way and construct a second, in which to incubate their egg.

The nest, placed on some ledge of the cliff's face, consists only of coarse sticks and twigs. When the eggs are first laid, there may be some lining of leaves, as in those of many other kinds of Vultures and Eagles; but when I visited the place the young were all hatched and the nest so coated with their droppings that it was impossible to trace any lining. The nest is nothing more than a thin, flat, irregularly circular pad of sticks, from 2 to 3 feet in diameter, and from 3 to 6 inches in depth.

As a rule, they only lay a single egg. Of all the fifty odd nests to which I made my way, not one contained more than a single young one.

Captain Repton, Deputy Commissioner of Ajmere, very kindly secured for me a noble series of eggs from these very nests, ten months after I had visited them.

Messrs. Davidson and Wenden write:—"At all seasons moderately common in the Sholapoor Districts. It breeds on some of the Satara cliffs in Tadli, and also in the valley of the Sina at Naywi."

And Mr. H. Wenden records the following note:—"On 6th December I noticed this species breeding on the splendid overhanging cliffs of the northern face of the Perseek Hills, through which the G. I. P. Railway passes by two tunnels, some 24 miles from Bombay. There were several nests; all on (to me) inaccessible ledges. One, into which I could see and on which sat or rather lay a bird, with its wings spread out and its neck stretched close to the rock, as though it were endeavouring to hide, contained one egg."

The egg's normal type is a very long oval. More or less elongated varieties are not uncommon; and in an enormous series that I took during the last fortnight in December 1877 at Ajmere, when, by the way, many were very hard-set and most of them more or less incubated, I found that one in five were more or less marked with pale reddish-brown blotches, spots, and mottlings at one or other end; and about one in twelve were most handsomely blotched and spotted, sometimes over the entire egg, sometimes exclusively at one end, where even when they extend over the whole egg they are always densest, with rich burnt sienna to blood-red. In these richly-coloured eggs there are usually also some pale purple secondary markings. Taking a large body, the eggs of this species are of a somewhat finer texture, more elongated, and more richly coloured than those of *Gyps indicus*. They vary in length from 3·48 to 3·9 inches, and in breadth from 2·62 to 2·85 inches. The average dimensions of twenty-one eggs were 3·61 by 2·72 inches.

**Pseudogyps bengalensis** (Gmel.). *The Indian White-backed Vulture.*

*Gyps bengalensis* (Gm.), *Jerd. B. Ind.* i, p. 10; *Hume, Rough Draft N. & E.* no. 5.

The Indian White-backed Vulture breeds from the latter end of October to the early part of March, but the majority, I think, lay during the month of January. The nest, as far as my personal experience goes (and I have seen many hundreds), is always placed upon trees, even where convenient cliffs and precipices are close at hand. Banyan and peepul are their favourite trees, I think; but I have found them breeding on the neem, tamarind, arjun (*Terminalia arjuna*), and others; in every case, however, on *large* trees. As a rule, they prefer to nest near each other, in the outskirts of some populous town, like Binderabund for instance, where ancient groves with suitable trees abound. I have seen as many as fifteen nests on one single peepul-tree, and as many as a hundred on a group of trees lying within a circle of 200 or 300 yards in diameter. It is not, however, uncommon to find a solitary nest, high up on some huge peepul-tree standing isolated in the midst of cultivated land or scanty jungle; but I have an idea that these are always the nests of young birds, and that while the clustered nests are tenanted by the same species year after year (in one case that I know of, for certainly the last fifty years), these solitary nests are rarely, if ever, re-occupied by this Vulture, who, after the first year, abandons them to other tenants. On two occasions I have found nests of this bird that I had robbed one year, occupied the next by the Dusky Horned Owl (*Bubo coromandus*), and once I found a lordly King-Vulture in possession of its plebeian brother's residence.

The nest is a large irregular platform of sticks, sometimes quite at the top of the tree, often wedged in a fork, averaging probably nearly 3 feet in diameter and 6 inches in thickness, but often far

exceeding this latter dimension, especially where a deep fork has to be filled in. Not far from Puhpoondh, I made a man measure one in my presence, which was an irregular cone (the apex downwards), by pushing an iron ramrod through it, and found the depth to be 22 inches! The materials of the nest appear to be heaped on at random, but in reality they are so carefully overlaid, that it is very difficult to pull out one of the sticks that compose the nest without pulling the whole fabric to pieces. The shape of the nest depends upon the locality, and is more generally oblong or oval than truly circular. There is only a slight depression, as a rule, towards the centre of the nest; but I found one nest near Hodul, which was a regular deep cup, in which I really think a moderately-sized sheep might have been stowed away. They always line the centre of the nest more or less with leaves, and the peepul seems their favourite. These leaves are green and fresh when the egg is first laid, and before you blow it you can pretty well guess how long the egg has lain in the nest by the condition of the lining leaves.

The late Mr. A. Anderson remarked that it "builds exclusively on trees, and seems to have a decided partiality for the burgot and peepul (*Ficus indica* and *F. religiosa*). It is the earliest breeder amongst our Indian Raptore. Several eggs were collected near Futtugurh as early as the 15th of October last year; and though I added considerably to the numbers in the following month, they were all, with one exception, without any spots. Later in the season, I got an egg almost completely capped at the small end with rich purple-red, but unfortunately it contained a live chick. A curious trait in the habits of this species, viz., that of breaking off green twigs with its beak for a nest-lining, does not appear to have been recorded before."

And he added these remarks subsequently:—"Last cold season I found a small colony of these Vultures breeding on a clump of high toddy-palms, whence I obtained four eggs. I have also lately taken *three* eggs from *one* nest and *two* from another, but of course not the produce of the same bird."

Mr. W. Theobald makes the following note on this bird's breeding in the neighbourhood of Pind Dadan Khan and Katas in the Salt Range:—"Lay in the first and second weeks of March; eggs, one only; shape, ovato-pyriform; size, 3·36 by 2·62 inches; colour, dull white; nest, of sticks and twigs, in large trees."

I shot a fine male off a nest on the 8th March, thus proving that the males participate in the labour of incubation. The female in this case did not return for some hours; and when she did, she was apparently so enraged at finding her egg (which was much incubated) gone, and her husband missing, that she tore the upper part of the nest to pieces, scattering the sticks and leaf-lining here and there, and making a wonderful snorting and hissing all the while. This is not the only instance I have witnessed of birds tearing their own nests to pieces in anger at the loss of their eggs.

Dr. Scully writes from Nepal:—"On the 18th November, while walking through the Pashpati wood, I was startled by hearing a

loud and prolonged hoarse roar. On going on a little further the sound was found to proceed from a pair of *P. bengalensis* in copulā on a large horizontal branch of a tree, some thirty feet above the ground. The cry was very remarkable, and more like what some large carnivorous mammal might be expected to utter than any bird."

Mr. Scrope Doig sends me the following note from the Eastern Narra in Sind :—"I found a colony of these birds breeding in the middle of a large swamp on an island on which there were a lot of large babool-trees; there were about forty pairs of birds, in many instances two and three nests were on the same tree. The date was the 20th November, and the eggs were all more or less incubated."

Major Bingham remarks :—"The White-backed Vulture breeds at Allahabad across the Ganges, opposite Mhow Serai near the village of Chupree, and more abundantly a little further on. Near Chupree I found on the 8th November two nests, large platforms of sticks and twigs placed high up in trees. Although the eggs were quite fresh, it was very difficult to get the old hen on one nest to move, no amount of blank firing at her under the nest had the slightest effect, and the native whom I had sent up seemed afraid to venture near; at length, however, he managed to hustle her off, when she sat on a neighbouring branch hissing like a whole colony of geese. At Delhi these Vultures have several breeding-places on both the Eastern and Western Jumna Canals."

Mr. G. Reid informs us that this Vulture breeds at Lucknow from November to the end of March.

Colonel E. A. Butler tells us that "the White-backed Vulture begins to lay in the middle of October, but the nests are often completed as early as the beginning of September, from which time until the egg is laid the hen bird is constantly on the nest, whilst the cock bird either sits on the edge of the nest or on a bough close by. I found three nests, apparently finished, in the early part of September this year (1876), and although the hen birds were sitting upon each occasion that I visited the nests, allowing the man who ascended the tree to approach within a few yards before flying off, when I left the district to return to Deesa (18 miles) on the 30th of the month, not one of them contained an egg. The nests in most instances are huge stick structures, sometimes well padded inside with peepul or banian leaves, sometimes without any lining. One or two nests seemed to be built almost entirely of huge leaves, teak, banian, &c.; but in most instances the formation and body of the nests were composed of dead sticks. I only found one egg in each nest. I took eggs this year (1876) on the 13th, 14th, and 15th October. All these nests were taken on the road between Deesa and Ahmedabad. Some on tamarind-trees, two or three nest on one tree, others single nests on banian and other tall trees. On the 20th October I found six more nests, four of which contained a single fresh egg each, and the other two each contained a single egg ready to hatch (chipped). On revisiting these last six nests on the 8th November,

I found that in four instances the hen birds had laid again, and in the other two the hen birds were on the nests evidently with the intention of laying again."

Messrs. Davidson and Wenden remark of this Vulture:—“Commonest at all seasons. D. got its nest with a young bird, just able to fly, in the Satara Districts, early in January.”

Mr. G. Vidal says:—“The common Vulture of the South Konkan breeds from October to January. Nests are usually found in mango or silk cotton (*Bombax malabaricum*) trees. As a rule not more than one nest is seen on each tree, but I once found within a few feet of each other on the same tree a nest of this species and of *Neophron ginginianus*.”

Writing from Lower Bengal, Mr. J. C. Parker remarks:—“On the 30th November and 7th December, I robbed several nests of this species and found all the eggs quite fresh. On the 3rd January visited another colony of these birds. Every nest had a chick in it. I had taken some eggs a fortnight before; these were hard-set.”

Lastly, Mr. Oates notes:—“December 5th. All nests searched on this date contained one young bird each. Nests placed in high peepul-trees near the top. Breeds abundantly in Lower Pegu.”

They lay normally a single egg. That two eggs *may* have been found in one nest, I will not take upon myself to deny; but I have before me now notes of eighty odd nests, and, besides these, I have had many others examined, of which I took no note at the time, and yet I never met with more than a single egg or a single young one *in any* nest. In colour, the eggs when fresh are dull white, with an excessively pale bluish-green tinge. As a rule, they are unmarked; but at times they are a good deal tinged and speckled, or even blotched, with darker or lighter shades of reddish brown, most usually, I think, chiefly towards the large end. The eggs of this species vary to an amazing extent. Whether, in reality, these eggs vary more than those of the other Vultures, or whether it is that the large series of over a hundred eggs, which I have myself collected, makes the variations more conspicuous, I cannot say; but the fact remains that I have the eggs of my own taking, of almost (for such a bird) every conceivable size and shape. The cubic contents of one egg (the largest) is certainly two and a half times that of the smallest. One is a perfect pear, another so long an oval as to be almost cylindrical, and one or two are almost spherical; the normal type, however, appears to be a somewhat broad oval, slightly compressed or pointed towards one end. As a body, they are more oval and less round than those of *Otogyps calvus*, while they are rounder and less oval than those of *Gyps indicus*. As above remarked, the majority, though often much soiled and discoloured as incubation proceeds, are of the usual pale greyish or greenish-white colour, and unspotted; but a certain number, perhaps about 1 in 5, are more or less speckled, spotted and blotched, always chiefly towards one end, with pale reddish brown. One egg only, out of more than a hundred that I have, is

richly and extensively blotched and clouded, in fact almost capped at the large end, with reddish and purplish brown. So discoloured do the eggs sometimes become before they are hatched, that I have one egg, an addled one, stained throughout an almost uniform earth-brown. The texture varies a good deal, but is generally moderately fine; a few exhibit a slight gloss, but mostly they are glossless.

The shell is very thick and strong, and, like that of most other large birds' eggs (especially those of Cranes and Game Birds), often has pimply lumps and crease-like folds at the small end. Held up against the light, the shell appears to be a rich green. The eggs measure from 3·05 to 3·85 inches in length, and from 2·25 to 2·8 inches in breadth; but of sixty-eight eggs measured, 3·26 by 2·42 inches are the average dimensions.

*Otogyps calvus* (Scop.). *The Black Vulture.*

*Otogyps calvus* (Scop.), *Jerd. B. Ind. i*, p. 7; *Hume, Rough Draft N. & E.* no. 2.

The Black or Indian King-Vulture breeds from the latter end of January to the middle of April; but, so far as my experience goes, by far the majority lay in March. In fact, as a rule, this bird hardly begins to lay until every *P. bengalensis* has hatched off.

I once found a nest with a fresh egg in November; but this was a most exceptional case. The nest I have invariably found on *trees*. It is said, Dr. Jerdon remarks, to breed on inaccessible cliffs; but at Ajmere, where, on the Taragurh hill, there are numerous suitable precipices, many of which are occupied by *Gyps pallescens*, I found a pair—the only ones I met with—breeding on a large peepul-tree at the foot of the hill.

Mr. R. Thompson says:—"This species is *very* common in the wilds of Central India; I have not yet known it to breed in cliffs, but have always found its nests placed on trees."

Captain Feilden says:—"At Bellary, in the Dekhan, where there were no trees except in and about villages, the King-Vulture used to build on bushes from 6 to 10 feet high, a species of cactus or euphorbia, the only plant common on the dry rocks in that part of the country. It appears to me that if these birds *ever* built on rocks, it would be in so rocky and treeless a place as Bellary. I remember finding a fresh egg of one of these Vultures on New Year's eve."

As far as my own personal experience goes, the nests are always on large trees, commonly on the very top of peepul and banyan trees, at least 30 or 40 feet from the ground. Mr. W. Blewitt, however, informs me that he obtained an egg of this bird on the 20th February, from a large nest (constructed of acacia-twigs and lined with leaves and straw), placed on the top of a keekur bush (*A. arabica*) in the Dhoona Beer, near Hansie, at a height of about 13 or 14 feet only from the ground.

Mr. W. Blewitt tells me that, besides the nest already alluded to, he found no less than seven nests of this Vulture, in the neighbourhood of Hansie, between the 6th and 24th March; each contained a single egg. Four of the eggs were quite fresh, two partly incubated, and one ready to hatch off; those taken on the 22nd and 24th March being quite fresh. Two nests were not above 14 feet from the ground, and no nest (this is not a part of the country where trees run high) was above 25 feet from the ground. Two were on keekur-trees, two (the two low ones) on old heens bushes (*Capparis aphylla*), and three on peepul, burgot, and sheeshum trees. The nests varied from 19 to 25 inches in diameter, and from 5 to 8 inches in thickness, and were all dense masses of thorny twigs of the ber (*Zizyphus jujuba*), khyr (*Acacia catechu*), and keekur. They were lined, some thickly, some thinly, with leaves or straw, and in one the egg was regularly bedded in leaves and straw. This is not altogether in accordance with my own experience; but in this, as in other cases, Mr. Blewitt sent me all the eggs and more than one of the parent birds, and there can be no doubt as to the accuracy of his observations. The same gentleman took a fresh egg of this species as late as April 13th, 1868. The nest was placed upon a peepul-tree, at a height of about 30 feet from the ground, measured about 16 inches in diameter by 6 inches in depth, and was composed of keekur-twigs, lined with fine straw and a few leaves. This was also in the Hansie district,

I have never found two pairs breeding near each other. The tree they commonly select is one standing altogether apart, in the middle of some dhak (*Butea frondosa*) jungle or waste place; but I have taken their eggs from trees belonging to groups situated in cultivated land, and on the 1st March, 1867, I found a nest (from which I shot the female and took the egg) on a peepul-tree situated right in the centre of the village of Deopoora, Zillah Mynpooree.

The nest is a huge flat platform, more often oval or oblong than circular, chiefly composed of sticks varying from 1 inch to  $\frac{1}{2}$  inch in diameter, loosely put together, but still, from their aggregate weight and the manner in which they interlace, forming a very solid structure. They always have a lining towards the centre, often of numerous strips, from 6 to 10 inches long and from 1 to 3 broad, of the fan-leaves of the toddy-palm, but not uncommonly of peepul, banyan, or neem leaves, or of slender twigs of these trees to which the leaves are attached.

The nest varies from  $2\frac{1}{2}$  to 4 feet in length and breadth, and is often more than a foot in thickness. Though I have no positive proof of it, native hunters assure me that, when not molested, they breed year after year during long periods in the same nest; and the materials of one nest that I demolished weighed over 8 Indian maunds (over 6 cwt.), and proved to have at least three distinct layers and to have been used many times. As, however, I know that this bird sometimes, like *Ketupa ceylonensis*, takes possession of old nests of *Haliaëtus leucoryphus*, of which bird there were several pairs in the neighbourhood, I cannot be cer-

tain that these Vultures had really, as the nest seemed to indicate and the villagers declared, bred in this same nest during many successive seasons.

They lay a single egg. I have heard it asserted that they sometimes lay two, and this is quite possible; but of the numbers of nests that I have personally examined, I never found one that contained more than a single egg or a single young one; and, in Upper India, I feel sure that *one* is the normal number.

Long ago, the late Mr. A. Anderson wrote in the P.Z.S.:—“The Black or Turkey Vulture is by no means an abundant species. It is a permanent resident, breeding on high trees, by preference on the peepul (*Ficus religiosa*), and laying a single white egg, which, as far as my experience goes, is invariably unspotted. Mr. Hume states that he ‘rather suspects that these birds pair in the air’ (‘Rough Notes,’ pt. i, p. 10). Such *may* be the case; but a pair of these Vultures in the cold season of 1867 built their nest on the very top of a gigantic tamarind-tree, opposite my house at Fyzabad, and I witnessed them ‘in copulâ’ *in their nest* at day-break every morning.

“In allusion to my having found *Gyps bengalensis* nesting on palm-trees, I have now to mention that on the 28th January last (1875), I saw a pair of King-Vultures building on a solitary tar-tree (*Borassus flabelliformis*). One bird invariably remained in the nest, sorting the materials as they were brought by its mate.”

He subsequently sent me the following note:—“As the first edition of ‘Nests and Eggs’ does not contain any information relative to this species breeding in the Himalayas, it may be as well to mention that on the 13th May last I found a pair building in Kumaon at an elevation of some 5000 feet, on the march between Takula and Bagesur. Although the country round about contained numerous eligible sites for a nest in a rocky situation, these Vultures seemed to prefer a tree on the hill-side. The birds were still carrying sticks, so I did not think it necessary to examine the nest.”

Major Bingham remarks:—“I have found this Vulture breeding both at Allahabad and at Delhi. At Allahabad I took three nests. The first at Reya, some 10 miles from Allahabad, on the 24th October. The nest was a mighty structure of branches and twigs and lined with a little straw. The egg it contained is pure white, densely speckled with rusty at the large end. The second and third nests were similar, but the eggs they contained were pure white, a little stained by the feet of the birds. One nest I found at Delhi on the 28th February was placed on an exceedingly tall, slender, and, till near the top, branchless neem-tree. This was of the usual form, a solid structure of sticks, but had a deep hollow and the egg was almost buried in dry peepul-leaves.”

Mr. J. Davidson writes from Gotekindee, in the Satara District:—“I was informed yesterday of a Vulture’s nest a few miles from here, so rode there this morning. The nest was placed on a low prickly bush, about *three* feet from the ground. The bush was growing on the side of a steep hill, the slope being at an angle of

45 degrees. The nest was rather a large one, neatly lined with straw, and the egg was slightly set. Both birds were present, one on the nest, and the other on a rock about 20 yards off. They were unmistakably *Otogyps calvus*. I did not shoot them, though within 15 yards of them, as there could be no doubt what they were. The choice of situation for the nest seems strange, as within half a mile there were plenty of large trees, banyan, peepul, and tamarind. On the 22nd of this month I saw another nest of this Vulture on the very top of the highest tree of a small group, a banyan. The egg was not laid, but both birds were constantly flying about the nest. Within 100 yards of this nest, on a very high peepul-tree, there was a nest on which the villagers said the White-backed Vulture had bred a month or so ago. The birds were still flying about, but the nest was empty."

And from the Western Khandesh he writes:—"As a rule, appears to resort to the Satpuras to breed, numerous nests being found by me in March there, and without exception on high trees in thick jungle."

Again, Mr. Davidson and Mr. Wenden, writing from the Deccan, say:—"Nest with one egg, found by D. in Sholapoor District, 26th December, 1874, and another with a single egg on 28th February, 1875. We saw numbers in the interval. Some nests near villages were in high trees, and others, far away from habitation, were in much smaller trees."

Mr. Scrope Doig, referring to the nidification of this Vulture in the Eastern Narra, Sind, says:—"The first nest of this species I took on the 13th February, and it contained a single fresh egg. I discovered eleven other nests within a radius of 6 or 7 miles. The nests were all placed on the top of low bushes. The nature of the country was low sandhills, covered with stunted jungle. Several of the nests were on the top of the wild caper bush, which was growing to the height of 8 or 10 feet. None of the other nests contained eggs, but both the birds were sitting close to the nests. I left a man to watch the nests and he took eggs from them between the 15th March and the 21st April. Some of the birds apparently never laid, or at any rate had not done so up to end of April. One nest, which was in another part of the district, I watched myself from 22nd of March to 5th of May, but without getting any eggs; during all this time the old birds were sitting either on the nest or close to it. Whether they eventually laid or not I cannot say. In no instance was there more than one egg, and all were of a pure white colour."

Colonel G. F. L. Marshall writes:—"One fresh egg taken at Agra on the 10th February. The nest was on the top of a very high peepul-tree, close to a village. The old birds were very wary. I saw a pair of them utterly routed by a pair of Eagles and driven off the offal they were feeding on."

Mr. J. C. Parker says:—"At the entrance of the Roopuckrani river, and close to the ruins of Fort Mornington, I found a nest of this bird on the 1st February, 1874, in a peepul-tree, the identical

one from which I took an egg of *Haliaëtus leucogaster* some years ago. The Vulture's egg was quite fresh."

The eggs, when first laid, are usually a nearly unsullied, pale, greenish white; but as incubation proceeds they become greatly stained and discoloured by the droppings of the parent bird. I have taken only one egg at all marked, and this showed numerous *very faint* dingy purplish streaks and spots, but possibly higher-coloured examples may occur.

In shape, the eggs vary from rather long ovals to nearly spheres; but the normal type I consider to be a round oval.

The texture is moderately fine; the shell *very* strong, and, as a rule, glossless; but I have found eggs with a faint gloss.

The egg-lining is green.

The eggs vary in size from 3·2 to 3·5 inches in length, and from 2·45 to 2·8 inches in breadth. Of twenty-four eggs measured, the *average* dimensions were 3·34 by 2·6 inches.

**Neophron ginginianus (Lath.). *The White Scavenger-Vulture.***

*Neophron percnopterus (Linn.)*, *Jerd. B. Ind.* i, p. 12.

*Neophron ginginianus (Daud.)*, *Hume, Rough Draft N. & E.* no. 6.

The White Scavenger-Vulture breeds from the latter end of February to the end of April; but the majority, I think, lay towards the end of March. They nest indifferently, it appears to me, on rocky precipices, earthen cliffs, parapets or cornices of buildings, and large trees. I have often found the nests on ledges of the clay cliffs of the Jumua, close to nests containing the young of Bonelli's Eagle or the Jugger Falcon. At Etawah, a pair yearly build on the church-tower, at the base of the steeple. One pair always breed on the portico of the Metcalfe Hall at Agra. On the rocky headland, known as the *Mata Pahar*, which juts out from the southern shore of the Sambhur Lake, whose blue waters it overlooks, I found a nest in a cleft of the rock, from which I was able to take the eggs without leaving the pathway; and within 2 feet of the head of the sitting bird was a nest containing three eggs of *Ptyonoprogne concolor*. They are far from seeking retirement. They build commonly in trees in the suburbs of towns—neem, tamarind, peepul, and burgot alike furnishing them with homesteads; and for several years I noticed a pair building on a comparatively small tree, in the centre of the busy grain-market at Etawah.

The nests are clumsy, ragged, stick structures; platforms slightly depressed towards the centre, loosely put together and lined with any soft substance they can most readily meet with. Old rags are a great stand-by. In many parts of the country, wayfarers, as they pass particular trees, have a semi-religious custom of tearing a strip off their clothes to hang thereon. Who puts the first strip, and why they do it, I have never clearly been able to ascertain; but once a beginning is made, "one fool makes many," and the tree

(usually a *babool*) soon becomes loaded with rags and tatters. These are a perfect godsend to the Neophrons of the neighbourhood, whom I have more than once watched robbing these rural "shrines" of their trophies by the score. Sometimes the rags of various colours are laid out neatly in the nest, as if an attempt had been made to please the eye; sometimes they are irregularly jumbled up with the materials of the nest. Cotton wool, old and dirty, stolen, I suspect, from the old 'rizais' or padded coverlids thrown with half-burnt dead bodies into the river, occurs occasionally in great lumps in the nest; and I have several times found nests lined entirely with masses of human hair, which, in a country where near relatives shave their heads as a part of the funeral ceremonies, often lies thick in the environs of villages and towns. Sometimes the birds line their nests with green leaves, much as many Eagles do. In size, the nests vary from 2 to 3 feet in diameter, and from 4 to 10 inches in depth.

Mr. W. Theobald makes the following note of this bird's breeding in the neighbourhood of Pind Dadan Khan and Katas in the Salt Range:—"Lay in the third week of March: eggs, two only; shape, long oval; size, 2·53 to 2·75 inches in length and from 1·85 to 1·90 inch in breadth; colour, pale brownish red, thickly blotched with dark brownish red: nest, a few twigs placed in holes of cliffs and difficult to approach."

Mr. W. Blewitt records taking some twenty nests of this species in the neighbourhood of Hansie between the 20th of March and the end of April 1868. The nests were all on trees,—peepul, sheeshum, burgot, neem, and keekur. None were more than 21 feet from the ground, and one was at a height of only 12 feet. They varied from 12 to 18 inches in diameter, and from 3 to 7 inches in thickness; some were slightly, some densely, put together, and were composed in almost every instance of small branches and twigs of the ber and keekur, both thorny trees. One nest had no lining, the others were more or less lined with straw, feathers, leaves, and rags, one or all; while in many instances rags were plentifully incorporated in the body of the structure. Two was the number of eggs in each nest; some of those taken at the end of April were still quite fresh.

In Northern India also this species is not confined to the plain: I have seen the birds fully 8500 feet high in the Himalayas, and have taken their nests below Simla at an elevation of fully 6000 feet. Mr. R. Thompson says:—"The Neophrons are to be found breeding in numbers along the precipices which crown the river Kossilla, from Khyrna upwards. On the sandstone precipices of the Sewaliks, and those of the Kumaon and Gurhwal outer ranges, numberless nests may be found. One pair breeds yearly on a precipice south-east of Nynee Tal."

Writing from Murree, Colonel C. H. T. Marshall tells us that he "found a nest in a cliff in May, with two fresh eggs, at an elevation of about 4000 feet."

Normally they lay two eggs; but I have repeatedly found birds

incubating a single egg: twice I have found three eggs in the same nest, but, in each of these latter cases, one of the three eggs was much smaller and feebler-coloured than the other two.

Major Bingham writes:—"I have not taken the trouble to collect many eggs of this Vulture, though it breeds commonly both at Allahabad and at Delhi in the end of February and in March."

Mr. Scrope Doig, writing from the Eastern Narra, says:—"Collected eggs of this species from the 15th of March up to the 2nd of May, but got most in April. Nests situated in pollarded kundy trees. Eggs varied much in colour, some being nearly white, while others, one or two in particular, were all of a deep, warm brick-colour, with two or three blotches of a very dark liver-colour."

Colonel Butler says:—"This Vulture breeds in the neighbourhood of Deesa in April. The nest is usually placed in the fork of some large tree about 20 or 30 feet from the ground or on the face of a cliff.

"Numerous nests on trees in the vicinity of Belgaum in February 1880; dates as follows:—7th, 11th, 16th, 23rd, 24th, 27th, and 28th. One egg of a somewhat remarkable type, being white covered with pale lilac markings, a remarkably handsome specimen."

Mr. Benjamin Aitken sends me the following note:—"A pair of these birds began to build in a tree in a compound in the station of Akola, Berar, near the end of June, 1869. The spot selected was between 15 and 20 feet from the ground. The birds continued till the close of the monsoon to carry sticks and rags to the tree and arrange them in the form of a nest; but they worked irregularly, stopping for a week at a time, and letting the rain destroy what they had put together, so that the nest was at no time more than half finished. In the following February (1870) the birds recommenced operations, but after working for a few more weeks gave up altogether, without ever laying an egg.

"In April, 1870, one egg was found on the outer ledge of the College tower at Poona. There were rags and sticks lying all along the ledge, but there was no approach to a nest, and the egg was lying on the bare *chunam*. A pair of White Vultures were habitually to be seen on the ledge."

Messrs. Davidson and Wenden write from the Deccan:—"Very common. They lay from the beginning of February to the end of March, the majority laying only one egg; but we have found them with two."

Mr. G. Vidal tells us that in South Konkan this Vulture is "rather scarce, both on the coast and inland. I have seldom seen more than one pair in any one place below the Ghâts. Above the Ghâts in Sattara it is, I think, the commonest of all the Vultures. The only two nests I have found in this district contained two young ones each in January, and were both built in forks of mango-trees."

Miss Cockburn says:—"On the Nilghiris, White Vultures are

almost as numerous as sparrows, particularly near Kotah villages. They fly, walk, or sit about them all day long. These birds roost on large trees. They sit on the top of the extreme branches perfectly exposed to the weather. The White Vulture here generally, I think, nests on rocks, sometimes nearly inaccessible. They accumulate a large quantity of warm soft materials. One nest I had brought down to me, and found it to consist of a most curious mixture of things—cotton, pieces of cloth, goat's hair, sheep's wool, large pieces of native blanket, and coir rope. Another pair of these birds had carried an entire sheep's skin with the wool to their nest.

"One of these nests had some dead frogs lying at the edge; these were most likely intended for the young. They lay their eggs in the months of March and April, after the first thunderstorms."

Mr. J. Darling, Junior, says that "this species lays in April. One nest was found at Katy, 2 miles south-east of Ootacamund, about 6800 feet above the sea. Another at Kartary, 6 miles south-east of Ooty, at 5000 feet. The first nest was a niche in a precipice, under the overhanging ledge of rock, in a very inaccessible place; the second nest could not be got at. The nest I reached was built upwards into a mound in a corner of the niche. The hollow in which the eggs were was very perfect and round. The nest, or mound, was composed of sticks and twigs, some the size of a man's wrist. The cavity was lined with cotton, coir, sheep's wool, and moss, a great accumulation of rotten bones and other decaying matter scattered about. The bird was off and on engaged in the process of building the nest from June to February, when it stopped, and, shortly before it commenced to lay, began to fill in the lining. The nest was 4 to 5 feet high, about 4 feet broad at the top; the hollow in which the eggs were was 18 inches in diameter and 6 inches deep. The eggs were four in number, taken in four successive weeks, one a week."

In shape, size, and colour these eggs vary much. I have one egg, an excessively long pear, another for all the world like a goose's egg, while others again are as round as an egg of the Honey-Buzzard; but the normal shape is certainly a rather broad oval, somewhat compressed towards one end. The texture varies a good deal: in some it is coarser than that of any Vulture's egg, and in some there is almost a gloss; but as a rule the eggs are dull, and of a rather coarse, somewhat chalky, texture, less compact and indurated than in any of the true Vultures. They never have any *real* gloss, but some exhibit a sort of surface glaze which they lose by washing, as indeed they are apt to do much of their richest colouring.

In colour the eggs vary from pure greyish or rufous white, with only a few minute reddish-brown specks at one end, to a uniform deep but dingy blood-red, recalling some of the deeper-coloured Falcon eggs. Between these two extremes every variation in shade, extent, and intensity of markings is found. Every possible shade

of brownish red and reddish brown is met with, and every degree of markings, from a few distinct scattered specks, to streaks and blotches nearly confluent over the greater portion of the egg's surface or forming a conspicuous cap at one (more commonly the larger) extremity.

There is a common type, with a pinkish-white ground, minutely freckled and speckled all over with dull brownish red, and then richly blotched and clouded towards one end (at which the markings are often almost or quite confluent) with a deep brownish red. Other eggs are uniform pale brownish pink, almost salmon-colour, without any deeper-coloured markings; while others of the same type have the colour deepening towards one end, or are richly and boldly, or in others feebly and faintly blotched, streaked, or clouded with a deeper shade. Some eggs when fresh are excessively handsome, and are coloured quite like a Honey-Buzzard's egg.

They measure from 2.28 to 2.82 inches in length, and from 1.8 to 2.1 inches in breadth; but the average of forty-five eggs measured was 2.6 by 1.98 inches.

## Order PLATALEÆ.

### Family PLATALEIDÆ.

#### *Platalea leucorodia*, Linn. *The Spoonbill.*

*Platalea leucorodia*, *Linn.*, *Jerd. B. Ind.* ii, p. 763; *Hume, Rough Draft N. & E.* no. 939.

The Spoonbill breeds, I believe, throughout India, and is common in Sind and other parts of the North-West.

There is no difficulty about the breeding-places of this species: I know fifty at least.

The Spoonbill is a very sociable bird. It always breeds in companies, at times small, at times enormous, almost always close to where other more or less nearly related species (notably Shell-Ibises) have their nests, and very often in the immediate neighbourhood of houses. They always build on trees near to, or on the bank of, some broad lake or swamp; and though I have found many parties breeding far away from human haunts, I have found many more nesting on trees actually in, or in the outskirts of, villages. In Busrehur, a large village a few miles from Etawah, three or four pairs of this species used to build, quite inside the place, on a few tamarind-trees standing inside a little courtyard. At Beenan some thirty pairs bred regularly on some half a dozen peepul-trees that

fringe the margin of the large jheel on the banks of which the village stands. But the grandest breeding-place I ever saw was about a dozen miles north of this in the south of the Mynpooree District, where the zeminders allowed no prowling sportsmen, and indeed soundly thrashed some egg-collectors of mine; and when a few days later I went myself only allowed me to take such eggs as I wanted, because they remembered me as a former Joint Magistrate of the district who had done them a good turn in more than one instance. When I visited this place in August there was a large oval sheet of water  $1\frac{1}{2}$  mile in length, and half this in width, clear, bright, and calm, but dotted over here and there with rushes and lotus-leaves. The village stands on a pretty high mound immediately overlooking the lake and towards one end. In front of it, at the water's edge, and on both sides of it, are numerous large peepul and tamarind trees; a little further on a group of neem; then a huge grove of ancient mango-trees runs down to the water's edge; beyond again are groups of date-palms, then more groves, &c., so that in fact the whole lake is almost entirely shut in by trees all round. This lake, when I had last visited it in March many years previously, to measure up and estimate loss of crops consequent on a terrible hail-storm, was, I should note, one huge wheat-field, except towards one end, just under the village, where a small pond remains in most years all through the hot weather.

All the trees on the right of the village were occupied by Spoonbills, certainly at least two hundred pairs were breeding there, but a still larger number of Shell-Ibises had nests in the trees to the left of the village. The neem-trees and the mangos were occupied by myriads of Paddy-birds, Egrets, and White Herons, and a clump of acacias was tenanted by the Little Cormorants and Darters. In a kudum tree were several nests of the Whistling Teal. In a huge hollow of an old mango-tree we got a Nukhtah on eight eggs, and the entire lake was alive with these various species.

The zeminders sent boys up to report upon the nests. At least a hundred of those of the Spoonbills were looked at, and only three or four contained five eggs, or young ones and eggs; in the great majority there were four. The nests were all of the normal type,—large platforms of sticks, from 2 to 3 feet in diameter and from 3 inches to nearly a foot in depth.

These birds had bred here from a time anterior to the traditions of the village. Once or twice during the previous fifty years there had been droughts, and the lake had remained dry and no birds had bred there, but next year they had reappeared and bred as usual. One thing was notable—though the birds were strictly preserved, if I may use the phrase, it was unanimously declared by all the people that during their lifetimes no perceptible increase in the numbers of any of the species had taken place, nor had they ever altered their respective quarters.

Many of the nests were blown down every year, many were pulled down by the boys, as they furnished excellent dry fuel, such as the lower classes here like for cooking, but where nests remained intact, all the pair that re-occupied them did was to add a few sticks and perhaps throw down a few of the old ones.

By the end of December, when I next visited the village, very few of the Spoonbills, Paddy-birds, and Herons, and none of the Shell-Ibises, were to be seen, but the lake, already somewhat shrunken, was alive with Pintail, Gadwall, Common and Summer Teal, with a few Wigeon, Mallard, Red-headed and Crested Pochards, and Grey Duck. A large party of the Great White Crane were enjoying the cool clear water and browsing on the water weeds, while a pair of Crested Grebe, of which I succeeded in securing one and which are *very* rare in these parts, were "steaming" about, like a set of monitors, with no part of their hulks above water. It seems to be the rule that both Spoonbills and Shell-Ibises remain only during the breeding-season at the spots where they breed; at other times they are spread far and wide over the whole country.

Major C. T. Bingham writes:—"I found a few nests of this bird not far from Mohar, the second station from Cawnpore on the East Indian Railway. The trees were at the edge of a little jheel and the nests high upon them, constructed rather massively of sticks and twigs and almost flat. The eggs, of which there were four in each nest, were quite fresh at the end of August.

Colonel E. A. Butler remarks:—"In the Eastern Narra, Sind, Mr. Doig found a colony with incubated eggs, breeding on trees in company with *Tantalus leucocephalus*, on the 11th November, but the two colonies were separate."

Messrs. Davidson and Wenden, writing of the Deccan, say:—"Common, and breeds in April and May."

Colonel Legge, writing from Ceylon, says:—"In the south-east of Ceylon this species breeds in March. Six or eight pairs were nesting at Uduwila in 1872, the nests being placed on the same trees with those of the Pelican-Ibis; they were situated low down, and in some cases small branches were bent down to form a foundation for the structures, which were made of tolerably large sticks and were rather massive."

The eggs vary much in size and in shape, but they are typically elongated ovals, much pointed towards one end. Excessively elongated varieties are common, and somewhat broadly oval specimens occur occasionally; but out of the numbers of eggs of this species that I have seen, I have never yet met with a specimen so little pointed towards the small end as the one figured by Mr. Hewitson in the 3rd edition of his 'Eggs of British Birds.' The texture of the egg is somewhat coarse, slightly chalky in its nature, and entirely devoid of gloss. The ground-colour is usually, when the eggs are freshly laid, pure white, but occasionally faintly tinged with pink or yellow; but, as incubation proceeds, they

become much sullied and soiled. Spotless eggs occur, but ninety-nine out of every hundred eggs are more or less marked. The markings vary much in extent and character, but they are often almost exclusively confined to the larger end, and they are always largest and most numerous there. The markings consist of more or less smudgy and ill-defined blotches and spots, with here and there a hazy spot, streak, or cloud intermingled. In colour and in intensity they differ much; in some eggs they are a clear bright brown, reddish brown, and even almost black, and in others they are feeble, dingy, yellowish brown or pale sepia, as if half-washed out. Occasionally both class of markings are found on the same egg, but this is the exception.

In length the eggs vary from 2·4 to 2·95, and in breadth from 1·65 to 1·95; but the average of twenty-nine eggs is 2·7 by 1·81.

### Family TANTALIDÆ.

**Tantalus leucocephalus**, Forst. *The Pelican-Ibis.*

*Tantalus leucocephalus*, Gm., *Jerd. B. Ind.* ii, p. 761; *Hume, Rough Draft N. & E.* no. 938.

The Pelican-Ibis is widely distributed throughout the Indian Empire.

It breeds, immediately at the close of the monsoon, in October in Upper India, in February in parts of Southern India.

Though by no means a rare bird, its breeding-places are not, in Upper India at any rate, very numerous, and I myself only know of one. I will quote the notes I made when I visited it on two occasions:—

“January 24th, *Gobhurdhum, Zillah Muttra*.—We found here a breeding-place, the first I have yet seen of the Pelican-Ibis. There were perhaps seventy nests on four trees,—three tamarinds and one peepul,—in the immediate neighbourhood of this village. The nests were loose ragged platforms, composed of thin sticks and twigs, and small for the size of the bird. At the time we visited them one or two full-grown dingy-coloured young were standing on each nest. They were able to fly, for every now and then a young one would rise from the nest and take a short wheeling flight, but they still had to be fed by the parents, one of which from time to time arrived to feed them. Whenever an old bird approached within thirty or forty yards of the tree, one could easily guess which its nest was by the state of excitement into which the young of that nest immediately got. As soon as the old bird alighted on the nest, the young, which up to that moment had been standing bolt upright at the full stretch of their long legs, squatted down open-mouthed in front of it to be fed, which the old one accomplished by apparently thrusting its large bill half-down the young one’s throat.

"From the size of the young birds, I should fancy that the eggs were laid from 12th September to 15th October.

"September 22nd.—Revisiting the Gobhurdhum pelicanary I was sorry to find that we were rather too early. The trees on which the nests have been placed all stand overlooking a pond, which at this season is a good-sized piece of water. At least one hundred pairs of birds must have been about the place, mostly, when we arrived about sunset, standing on or beside their nests, but a few still occupied in fishing or catching frogs in the pond beneath. We sent a boy up who examined all the accessible nests, probably some fifty, but in only three did we find eggs, and only one in each of these."

Some years later Mr. Henry Blewitt kindly visited the spot in October, and procured a fine series of the eggs, which he sent me.

Mr. Henry Blewitt says:—"The eggs that I send you were taken on the 26th October from the nests that you yourself visited one year when on tour. They are placed, as you will remember, on the branches of large tamarind and semul trees which grow at the edge of the Gobhurdhum Tank. The largest number of eggs that I have found in any nest was four, and the smallest two.

"In some nests there were two eggs and one fledgling; in others two eggs and two fledglings; in some two, three, or four eggs, and no young birds. The great majority of the eggs were a good deal incubated, and there were many young birds in the nests, and I should fancy that some eggs must have been laid as early as the 1st October at any rate."

Mr. R. H. Whitten has this year (1874) visited this spot, and reports as follows:—

"On the west edge of the sacred tank at Gobhurdum, a town in the Muttra District, thirteen miles from Muttra on the road between that city and Deeg, are some forty or fifty tamarind and papree trees, chiefly tamarind, which are annually frequented as a nesting-place by numbers of Pelican-Ibis. These birds make their appearance there early in September, and soon after their arrival pair off and commence breeding. Some eggs taken in the middle of October were found to be partly incubated. The birds appear to leave with their young brood towards April. The reason why they frequent this place is probably that they are seldom molested and never shot at, the tank being a sacred place, and that frogs and small fish, with which they feed their young, are easily procurable in the tank.

"The place was visited twice this year,—once in the middle of October, and a second time on the 5th of November. On the first occasion many of the nests contained no eggs. Altogether, on both occasions, more than one hundred eggs were taken from the nests.

"When the place was visited, there were about two hundred pairs of birds there. They breed in pairs, each pair having a separate nest. The male bird assists the female to incubate the eggs. The nests were some sixty or seventy feet from the ground,

and were composed of dry twigs of kurrel, chownker, plum, tamarind, &c.; as many as twenty nests were found on one tree. Preference seemed to be given to particular trees. The smallest number of nests in any of the trees chosen to build on was five. The nests are large, measuring as much as 2 feet in diameter, and weighing from 5 to 6 lbs.

“From two to eight eggs were found in each nest. In some of the nests eggs quite fresh were found, in others they were partly incubated. Incubation seemed to have commenced only in the nests where there were more than four eggs. Eggs may be obtained from the middle of October to the middle of November. There are no eggs now there at the middle of December, but the majority of the young birds are not yet fully fledged, though some are able to fly about the nest.”

Mr. Doig writing from the E. Narra, Sind, says:—“I found a large colony of these birds breeding in the end of February. The nests, which seemed very small for the size of the bird, were rude stick platforms built on decayed trees about 6 or 8 feet over water-level. The nests all contained young birds very many nearly able to fly.”

And Colonel Butler remarks:—“Mr. Doig sent me twenty-three fresh eggs which he took in the Eastern Narra, Sind, on the 9th Nov. The birds were breeding in company with *Platalea leucorodia*, but the two colonies were separate.”

Writing of Rajputana in general, Lieut. H. E. Barnes remarks:—“The Pelican-Ibis breeds in colonies during March and April.”

In Upper India, therefore, we may, I think, say that the majority of the birds lay, earlier or later according to season, from the last week of September to nearly the middle of November, that four is the usual complement of eggs, though they sometimes lay as many as eight, and that the young birds are mostly able to fly, though they have not as yet left the nest, by the latter part of February.

The following is Burgess’s well-known account of their breeding in the Dekhan. He says:—“In another village, about ten miles from the Godaverry River, where there are a great number of large banian trees both outside and inside the walls, I found a community of these birds, which had built their nests on them, probably to the number of fifty.

“The trees inside the walls were as thickly covered with nests as those outside, and the birds, which appeared docile and tame, did not mind the noise of the people passing beneath them. When I visited the village, the young birds were all well fledged and most of them able to fly. The villagers informed me that the old birds move off to the river in the very early dawn, and having caught a sufficient supply for their young return about 8 or 9 o’clock; a second expedition is made during the afternoon. Some idea of the quantity of fish caught by these birds may be gathered from what the people told me, that quantities of fine fish were dropped by the old birds when feeding their young and were eaten by them. A young bird of this species, which I shot in Sind,

disgorge a large quantity of small eels. This Ibis breeds during the month of February. The nest is composed of small sticks, and is placed at the top of the trees; if there are many on the same tree, they are placed pretty close together. They lay three or four eggs of a dull opaque white, nearly 2·6 inches in length by rather more than 1·8 inch in width. The young birds are able to fly by the month of May."

Dr. Jerdon states that "it breeds on high trees, making a large nest of sticks, and laying four white eggs, sometimes faintly blotched with pale brown. Burgess found fifty nests together in some large banian trees in a village in the Dekhan in February. Further north it is later, breeding in May and June."

This latter requires verification. I have not been able to ascertain that they breed anywhere in India in May or June.

Mr. J. R. Cripps, writing from Furreedpore in Eastern Bengal, remarks:—"By no means common. A rainy-season visitant. The south-eastern corner of the Mymensingh district is one huge swamp covered with scrub and long grass, and on the large trees about these birds lay in the cold weather; the half-fledged birds have been brought to me in the second week of December."

Colonel Legge writes in his 'Birds of Ceylon':—"The only breeding-place of this Ibis which I visited in Ceylon was the colony at Uduwila tank. There, among the numerous species nesting at the time of my visit, were about a dozen pairs of the Pelican-Ibis."

The eggs, which vary much in size and somewhat in shape, are typically elongated ovals, a good deal compressed towards one end. At times they are somewhat pyriform, at others very perfect ovals. The shell is rather fine and compact, of a dull white colour, much stained and soiled as incubation proceeds, and occasionally with a few dingy brown spots and streaks. They are entirely devoid of gloss. In some cases they have a *very* faint greenish tinge, which fades soon after the egg has been blown. In size they average, I think, somewhat larger than those of the Spoonbill, but in general appearance and texture of shell they most nearly resemble the eggs of *Ibis melanocephala*, which latter, however, average very much smaller. Held up to the light and looking into the egg through the aperture, the shells of the present species are a pale bluish green or pale dingy green, while those of *Ibis melanocephala* are a very dark dusky green; on the other hand, the shells of the Spoonbill are a dusky yellowish brown, in this respect assimilating to those of *Anastomus oscitans*; while those of *Xenorhynchus asiaticus* are a green so dark as to be almost black, and those of *Dissura episcopus* a green of nearly the same shade as those of *Ibis melanocephala*, or at times a trifle darker.

In length the eggs vary from 2·58 to 2·95 (though I have one abnormally large egg that measures 3·2), and in breadth from 1·75 to 1·98; but the average of twenty-seven eggs is 2·77 by 1·88.

## Family ANASTOMATIDÆ.

*Anastomus oscitans* (Bodd.). *The Shell-Ibis.*

*Anastomus oscitans* (Bodd.), *Jerd. B. Ind.* ii, p. 765; *Hume, Rough Draft N. & E.* no. 940.

The Shell-Ibis appears to breed throughout the greater part of India.

I have seen hundreds of their nests, but all in one part of the country—the Central Ganges Doab. There they certainly lay in July and August, and there each pair have their own nest—a large stick platform built upon high trees with from three to thirty nests on the same tree. Five is, I think, the maximum, and four the usual number of eggs.

In Ceylon, according to Mr. Layard's native informants, it defends its nest pertinaciously; in the north it is less valorous. I have robbed or seen its nest robbed a score of times, and never yet saw it make the feeblest attempt ever to defend its *penates*.

Writing of his experience in Oudh, Colonel L. H. Irby tells us that the Shell-Ibis is "common throughout the year. At a place named Kupser on the River Kutna, a branch of the Goomtee, this bird breeds in a large colony on two or three tall trees growing on the banks of the river. The nests are immense stacks or rather platforms of sticks one above the other, several pairs nesting on each platform without any apparent separation of the eggs, which on 26th June were hard-set on and of a chalky white colour, smaller than, but about the same shape as, the egg of *Ardea cinerea*."

I do not question the correctness of this account: Layard tells us much the same about the White Ibises in Ceylon; but still I must note that I personally have never seen any of these joint-stock nests, though I must have visited at one time or another more than a score of breeding-places.

I have never seen the nests of this species intermixed with those of others. Very commonly they breed quite away by themselves, and I have only once (on the occasion referred to under *Platalea leucorodia*) myself seen their nests in close proximity to houses; but I know that they often do choose trees in the very midst of villages.

Major C. T. Bingham writes:—"On the 9th July last, I found the Shell-Ibis breeding in large numbers in the centre of the village of Umraha, 1½ mile from Jusra, the second station from Allahabad, on the Jubbulpore line.

"The nests were placed on the topmost branches of large trees,—peepul and neem being invariably chosen, although there were some fine mango and other trees in the neighbourhood. The nests were circular platforms, some 4 inches thick and 20 inches in

diameter, of sticks, among which I recognized twigs of peepul, neem, ber, and babool. There was a slight depression in the centre, scantily lined with leaves of the peepul and neem, and grass; this lining in the sixty odd nests I examined had been wetted (most likely by the birds returning wet from the neighbouring paddy-fields and tanks, which furnished their food), and added by its decay and fermentation to the warmth of the nests.

“The number of eggs varied from two to five in each nest. In one I found two hard-set ones, and in a second six, one (evidently from its colour the last laid) very small.

“Their colour, normally, is pure white, but as incubation proceeds they get much soiled by the feet and droppings of the bird. The average length and breadth of forty eggs measured (leaving out the abnormally small one above mentioned) is—length 2.20 inches, breadth 1.49 inch.

“As far as I know, they have only one brood in the year, and use the same nests, repairing them year by year. There could not have been less than from 150 to 200 pairs of the birds breeding here. In one peepul-tree I counted no less than sixty-two nests, and not only the nests themselves, but the branches of the tree and the ground underneath were covered with the droppings of the birds.

“One or two of the Ibises made a feint of defending their nests, opening and clattering their bills threateningly, but flying off when my servant, whom I had sent up, got close to them. In one case, however, my man had to push the bird with a stick, and as it flew away I shot it. It proved to be a male.”

Mr. Scrope Doig, writing from the E. Narra, Sind, says:—“Found this bird breeding in company with Herons, Egrets, &c., in August.”

In Ceylon, according to Colonel Legge, this species breeds in January, February, and March.

The eggs are typically oval, of much the size and shape as an English hen's egg, but narrow, elongated, and pointed, as well as pyriform, varieties occur. In texture the shell is generally close and satiny, being perceptibly smoother to the touch than those of *Graptoccephalus papillosus*, *Ibis melanocephala*, the Spoonbill, or the Heron; and in this respect, as well as in colour, closely approximating to the larger and differently-shaped eggs of *Dissura epis-copus*. The eggs, when freshly laid, are a sort of creamy white, entirely free from markings of any kind, but as incubation proceeds they become the same dirty earth or yellowish brown that the eggs of the White-necked Stork, the Little Grebe, and other species assume.

In length the eggs vary from 2.0 to 2.52, and in breadth from 1.48 to 1.82; but the average of fifty-seven is 2.24 by 1.6.

## Family IBIDIDÆ.

*Ibis melanocephala* (Lath.). *The White Ibis.*

*Threskiornis melanocephalus* (Linn.), *Jerd. B. Ind.* ii, p. 768; *Hume, Rough Draft N. & E.* no. 941.

The White Ibis breeds, I believe, pretty well throughout India; but I myself have only taken the nest in the central portion of the Doab. About Etawah, Cawnpoor, and Mynpooree this species begins to lay as soon as the rains commence, and I have found eggs as early as the 20th June and as late as the 28th August. They breed generally in small companies, often by themselves, and well away from human haunts, but at times in the society of other species and in the outskirts of villages.

I never found, I think, more than a dozen pairs of this species breeding together, and I have more than once found solitary pairs.

Large banian, peepul, and tamarind trees are what they prefer to build on, and they construct a moderate-sized stick-nest, perhaps 20 inches to 2 feet in diameter, with a more or less well-marked central depression.

They lay two, three, and very rarely four eggs. Layard says five or six, but I rather doubt this; anyhow I have never found *more* than four eggs, and very seldom this number even, while I have dozens of times *found* two or three eggs ready to hatch off, or two or three young ones in a nest.

From Jhansi Mr. F. R. Blewitt wrote:—"On the 1st July 1868, on a large peepul tree, at its very summit, between four forks of a branch I found a nest of the White Ibis containing two eggs.

"The nest was about 2 feet in diameter, with a hollow in its centre for the eggs. The exterior of the structure was of coarse twigs of the tree itself; the inner part of finer twigs of sorts. Altogether, it was not so neatly made a nest as that of *Geronticus papillosus*.

"The two eggs are of a dirty chalky white, but, as far as I can observe, without the rusty blotches alluded to by Layard. The eggs, when I secured them, were within a day of hatching.

"In length they measured 2·6, and in breadth 1·8."

Major C. T. Bingham writes:—"I found this Ibis breeding in large numbers on the 19th August on a mighty tamarind-tree, on the north bank of a large tank in the centre of the village of Mohar. There must have been some twenty to thirty pairs breeding on this tree, and beside this there were over forty odd nests of the Shell-Ibis. The nests of the latter I counted, as they were easily distinguishable by their larger size; and on examination I found that whereas the Shell-Ibis had all young more or less fledged, the White Ibises had not yet hatched off. Of the eggs of

the latter I procured four, which were all I was allowed to take, as the villagers objected to the birds being disturbed."

Colonel Butler sends me the following note :—" Mr. Doig and I found a colony of about a dozen pairs breeding in the E. Narra, Sind, on the 24th July, 1878. The whole of the nests, which were about 1 foot apart and about 8 or 10 feet from the surface of the water, were small stick structures similar to Egrets' nests, and were closely packed on a tree that had been partly blown down, in the centre of a dense tamarisk-thicket growing in the middle of a large dhund.

" Large colonies of Herons, Egrets, Cormorants, and Snake-birds were breeding all round in the same clump of trees, but their nests were not built in clusters like those of the Ibises. On approaching the spot, the Ibises rose off their nests and commenced flying round and round and backwards and forwards overhead ; and on sending a man up the tree, the nests, with the exception of one with young ones, were all found to contain fresh eggs, most of which were plain but in a few instances spotted with yellowish brown. We found out afterwards that the men with us had robbed these nests the week before, so that this was a second batch of eggs. Mr. Doig drew my attention to the peculiar booming call of the bird, which he described as a most remarkable note, but I did not hear it myself. There was another colony a little further on, but as the jungle was thick and the water deep we did not visit it."

Messrs. Davidson and Wenden, writing of the Deccan, say :— " Not rare. D., having observed them this year on the Bhima from October until about the middle of July, concludes that they probably breed in the district."

Colonel Legge writes from Ceylon :—" Several pairs of these Ibises were frequenting the breeding-place already noticed at Uduwila tank near Tissa Maha Rama ; but their nests were on trees growing in the water and inaccessible, and consequently I was unable to procure their eggs or young. The time of my visit was the 25th March, and as most birds then had young, I conclude the same was the case with the present species."

I know no species of which the eggs vary more in size than those of our present bird.

The cubic contents of some specimens that I possess are of fully three times those of some others. In shape too the variation is great ; typically they are long ovals, much pointed towards one end, but some are nearly perfect ovals. Some are pointed at both ends, like a Cormorant's egg, and some are pyriform. When freshly laid, they are of a delicate bluish or greenish white, but little, if at all, darker than the eggs of *Bubulcus coromandus* ; but during incubation the blue or green tint fades and disappears, and the white gets soiled or stained till some eggs are all brown and dirty, like a hard-set egg of *Anastomus oscitans*.

The majority of eggs are free from spots or markings, but I have met with a few examples delicately spotted with yellowish brown. The texture of the eggs, though slightly coarser, is quite that of the Heron, and I have no doubt that these Ibises are correctly placed

by Jerdon in juxtaposition with the Herons, while *Anastomus oscitans* would seem, to judge from its eggs, to need a place amongst the Storks.

In length the eggs vary from 2·1 to 2·82, and in breadth from 1·5 to 1·82; but out of one hundred and twelve eggs only four are less than 2·3; and again only four exceed 2·72 in length, and only one is less than 1·6 in breadth, so that for practical purposes we might say that the eggs vary from 2·3 to 2·72 in length and from 1·6 to 1·82 in breadth. I may add that the average of the one hundred and twelve eggs is 2·54 by 1·7.

**Inocotis papillosum (Temm.). The Black Ibis.**

*Geronticus papillosum (Temm.)*, *Jerd. B. Ind. ii*, p. 769; *Hume, Rough Draft N. & E.* no. 942.

The Black Ibis breeds everywhere throughout the plains of India. In Upper India it seems to have two breeding-seasons, viz., March, April, and August; but I have also known eggs to be obtained in June, July, and September. I cannot say whether the same pairs breed twice in the same year, or whether different birds breed at different times. Perhaps the old birds lay in March and April, and the yearlings not till August. These are points in regard to which further observation is necessary.

In parts of Southern India, as in Sholapoor, this species lays in November and December.

I have never found these birds breeding in society with other species. Twice or thrice I have found two or three nests together, but as a rule they are solitary. They build high up upon large trees, often at the very top of these, and make a large nest of finer and coarser twigs—often unlined, but more often thinly lined with straw, grass, or (Mr. W. Blewitt says) old rags.

They occasionally to my knowledge—and possibly often—take possession of nests previously occupied by the Indian King-Vulture, the Indian Fishing-Eagle, and the Dusky Horned Owl. Who first made the nests, and whether the Ibises were the intruders, or only reoccupied their own old nests that the Raptors had taken the liberty of using in the interim, I cannot say; but certain it is that from nests from which in March, December, and January I had taken the eggs of the latter, I again in August took those of the Black Ibis.

According to my experience three is the usual, and four the maximum number of eggs.

Mr. W. Blewitt, writing from Hansie, remarked:—"I took three nests of the Black Ibis this year on the 12th and 18th June. Two nests contained 2, and the third 3 eggs: all were quite fresh. The nests were two of them on sheeshum-trees on the canal-bank, at heights of fifteen to seventeen feet from the ground; the third, which was on a peepul-tree, was somewhat higher. All were very

similar loose platforms from 18 inches to 2 feet in diameter, composed of stout twigs of the keekur and plum, and lined with straw and rags."

Next year he wrote:—"On the 3rd and 4th April I found two nests of this bird near Hansie,—the one on a peepul, the other on a burgot tree. The nests were high up, from twenty-five to thirty feet from the ground, some 14 inches in diameter and 4 or 5 inches in thickness, constructed of keekur and bēr twigs and sticks, and with a few rags and feathers, by way of lining, immediately under the eggs, of which there were two fresh ones in the one nest and a single one in the other."

Writing from Jhansi, Mr. F. R. Blewitt remarks:—"The first nest I got of this bird was at Delhi in the latter end of March with, I think, three eggs. Here the nest and four eggs were secured on the 27th August. The peepul-tree is by preference selected by the Black Ibis for its nest, which is placed between two or three forks of a topmost branch.

"The nest is composed of thick twigs of the peepul and some thorny acacia-like tree on the outside, with an intermediate layer, nearly two inches thick at the sides and base, of finer twigs, all compactly put together. The lining was of grass slightly laid on in the cavity. The outer diameter may fairly be stated at about 18 inches; inner, less by some 4 inches. Egg-cavity, about 3 inches deep."

Writing from Etawah, under date August 1868, Mr. Brooks said:—"I have just had a nest taken of *Inocotis papillosus*, which I saw the birds building some little time ago. I had previously no well-authenticated egg of this species."

Colonel G. F. L. Marshall states that in the Alligurh District this species lays in July, August, and September. He says:—"I noticed a bird on its nest on the 23rd August; on the 11th September I visited it again and found that the young had flown. It was built of sticks and situated in a very large fork of a peepul-tree about halfway up, and hardly visible from below.—Another nest, with four partly incubated eggs, was found on the 17th September; it was rather loosely made of sticks and grass in a small fork at the very top of a large peepul-tree and was reached with great difficulty. The tree was close to a village in the Alligurh District; both parent birds kept circling round over the nest."

Major Bingham says:—"I have found only one nest of this, and that was placed in a large peepul-tree in the village of Okla, a few miles from Delhi. On the 7th May the nest, which was a large firm platform of sticks having a shallow depression lined very thinly with grass, contained two fresh eggs."

Colonel Butler sends the following notes:—"One or two nests were reported to me at the Tanda, 20 miles from Hyderabad, Sind, at the end of July 1878.

"I found a nest of the Black Ibis near Deesa on the 6th August, 1876, containing two fresh eggs. It was made of dead sticks, very

like a Crow's nest, but lined with a substantial layer of grass. On the 12th September, I found another nest, about 18 miles from Deesa, containing three incubated eggs. The first nest was nearly at the top of a tall banian-tree, and the second on a tree (apparently dead).

"A nest I found on the 7th August was built on a tree growing in the centre of a tank, and the old bird sat closely for several days before laying. Sometimes four or five nests are built on one tree, and most of the nests I have examined were lined with grass. I believe that the majority of birds in this part of the country lay at the commencement of the hot season, as out of the numbers I saw in August, September, and October this year, I only found a few pairs breeding."

Mr. J. Davidson remarks:—"Here, on the western Sholapoor District, a pair or so of the Black Ibis are to be met with in every village. I have this year already the following nests:—

"November 22nd.—On a small tree, three young, about a fortnight old (apparently).

"November 28th.—On a very tall tamarind, two young about the same age as the last.

"December 1st.—Birds building on a small tamarind.

"December 4th.—Nest, three eggs, fresh, on a middle-sized neem-tree among the small branches.

"December 6th.—Two small young ones, on a neem-tree in the village.

"December 9th.—One containing one young about a day old, and another prepared for eggs; the birds busy making love on the side of the nest; a third nest with two eggs, the bills of the chicks protruding, very pale blue, no markings, slightly larger than those taken on December 4th."

Dr. Jerdon says that this species lays from two to four *white* eggs, but this is certainly a mistake.

Messrs. Davidson and Wenden, writing of the Deccan, say:—"Common, breeding in May and again during the last three months of the year. We do not think the same pairs breed twice."

The eggs are normally moderately long ovals, more or less pointed or compressed towards one end. They are very Heron-like in their appearance, of a beautiful sea-green, as bright as those of *Ardeola grayi*. As a rule, like the Herons' eggs, they are unspotted, but occasionally, as is the case with those of *Ibis melanocephala*, speckled varieties, thinly spotted and streaked with brown or yellowish brown, occur. I have even obtained one or two with numerous dingy brown specks, spots, and streaks. In texture the eggs are considerably coarser than those of the true Herons, even more so than those of the preceding species.

In length the eggs vary from 2.24 to 2.77, and in breadth from 1.6 to 1.86; but the average of twenty-eight eggs is 2.43 by 1.7.

Graptocephalus davisoni (Hume). *Davison's Black Ibis.*Graptocephalus davisoni (Hume), *Hume, Cat. no. 942 bis.*

Davison's Black Ibis is found throughout Pegu and Tenasserim. Mr. Oates found the nest in the former. He says:—"The nest was placed on the branch of a tree about 15 feet from the ground on the banks of a creek. It was a small shapeless mass of sticks and contained two eggs so near hatching that I could preserve only one. It measures 2·55 by 1·8; it is smooth, without gloss and of a pale blue, much stained by the bird's feet. The nest was found on the 13th February."

Plegadis falcinellus (Linn.). *The Glossy Ibis.*

Falcinellus igneus (S. G. Gmel.), *Jerd. B. Ind.* ii, p. 770; *Hume, Rough Draft N. & E.* no. 943.

I have never succeeded in discovering a breeding-haunt of the Glossy Ibis. It breeds about some of the Dhunds in Sind, but, so far as the mainland of India is concerned, I have never been able to ascertain any particulars of its nidification.

Colonel W. V. Legge, however, writing from Ceylon, remarks:—"I found the Glossy Ibis nesting at the end of March 1872, in thorny trees growing round a small tank in a wild part of the south-east of the island; there were, I should say, about half a dozen pairs of the birds present at the heronry and they were nesting partly in company with *Pelecanus philippensis* and *Tantalus leucocephalus* and partly with *Platalea leucorodia* and *Graculus javanicus*. The nests were placed on the lateral, lower branches of the trees and were of the same size as those of the Little Cormorant, constructed of medium-sized sticks, and flat in shape.

"I regret to say that at the date, the 25th of March, that I discovered this large heronry, the young of *F. igneus* were all hatched and well-grown, so that I failed to procure any eggs of the species. The young perched on branches contiguous to, or stood on, their nests, and when I attempted to catch them, scrambled out of the way with considerable agility. I however caught one or two, but I was less fortunate with them than with the young of other species that I brought away, for I found them dead on the following morning."

Mr. Scrope Doig writes from the E. Narra, Sind:—"In May 1878 I observed these birds in pairs, and sent men after them to try and find out their breeding-grounds, but in vain; and so being unable to go myself, in consequence of work, I was obliged to give up the search. This year, however, in June I was able to search myself, and found them breeding in great numbers on trees along the banks of the large lakes inside the sandhills, along the bank of the Narra. The nests were placed on the tops of kundy-trees, and were constructed of sticks, about the size of those of *Plotus melanogaster*; on the same trees I found *Geronticus papillosus* and *Tan-*

*talus melanocephalus* breeding, while close by were numbers of nests of Herons, Egrets, and Cormorants. The eggs are of a beautiful green colour, roughly pitted over with slight indentations giving the shell a rough appearance ; they are in shape ovals pointed at both ends. The normal number of eggs is three, and they vary from 1.8 to 2.15 in length, and from 1.3 to 1.55 in width, the average of 35 eggs being 2.01 in length and 1.40 in width."

The eggs of this species are perhaps the most beautiful of any of this family. They are elongated ovals as a rule, regularly pointed towards the small end, and they are of a beautiful uniform blue, a little darker in some specimens, a little paler in others, but with scarcely any green tinge in any of them. The shell is very fine and compact (the pores being very inconspicuous) and has a slight gloss. It is the elegance of the shape of the egg and the extreme uniformity of the tint, coupled with its great purity, that makes these eggs so beautiful as they are.

## Order HERODIONES.

### Family ARDEIDÆ.

**Ardea goliat**, Temm. *The Giant Heron.*

*Ardea goliath*, Temm., *Jerd. B. Ind.* ii, p. 739 ; *Hume, Rough Draft N. & E.* no. 921.

I know nothing of the nidification of this species—the Giant Heron. It is so rare that I have never seen an Indian-killed specimen, except those in the Calcutta Museum, obtained by Mr. Blyth, and I have never yet met with any one else who had. But Mr. Blyth tells us (*Journal Asiatic Society*, 1855, p. 280) :—“In the same neighbourhood,” namely, in the south-east part of the Soonderbunds, “Mr. Frith was credibly assured that the huge *Ardea goliat*, Rüppell (*A. nobilis*, nobis, &c.), also bred, and he expects to be able to procure the eggs of all three species during the next breeding-season.”

**Ardea insignis**, Hodgs. *The Dusky-grey Heron.*

*Ardea sumatrana*, Raffl., *Jerd. B. Ind.* ii, p. 740 ; *Hume, Rough Draft N. & E.* no. 922.

Our Indian Dusky-grey Heron breeds to my knowledge in the Terai below Darjeeling and Nepal and in the Bhootan Dooars, and I have had a large stick-nest, placed high upon a huge tree in a swamp and utterly unapproachable, pointed out to me as belonging to this species ; I was also assured that it bred during July and August, which would fully account for no one having ever taken the eggs, since no European could live many days during these months in the localities it affects.

*Ardea cinerea*, Linn. *The Common Heron.*

*Ardea cinerea*, Linn., *Jerd. B. Ind.* ii, p. 741; *Hume, Rough Draft N. & E.* no. 923.

The Common Heron breeds throughout India wherever there is any water and suitable feeding-ground in the neighbourhood, alike in the plains and in the hills to an elevation of 4000 to 5000 feet. It breeds at very various seasons, and may very possibly have two broods here in the year, but too little is as yet on record about its nidification in India to enable me to speak positively.

In Etawah I have taken numbers of its eggs in the latter portion of July and in August, and I have had eggs sent me from Hansie taken in March and April, and from Saugor taken in April and June.

As far as my experience goes, this species always builds on trees. I have never yet found its nest in reed-beds, which the Purple Heron preferentially affects for nidification.

The nest is a large loose irregular platform of moderately thick sticks and twigs, with a tolerably deep central depression, which, though often quite unlined, is more often I think thinly lined with grass.

Sometimes, when laying in March and April, they build in a small party by themselves; but more generally, I think, they lay in India during the rainy season, and then their nests will be found as a rule on trees, in amongst scores of nests of the Pond-Heron, large White Egrets and White Ibises.

At home I have more often, I think, found four than three eggs in Herons' nests, but in this country out of certainly fifty that I have examined I never chanced to meet with more than three.

Mr. W. Blewitt sent me a number of eggs of this bird and remarked:—"I have found five nests in the neighbourhood of Hansie this year between the 26th and 29th March, each containing two or three fresh eggs. The nests were all on peepul and burgot trees from twenty to twenty-five feet from the ground, and were shallow platforms some 12 to 15 inches in diameter, and 3 or 4 inches in depth, constructed rather loosely of keekur twigs and lined with a little straw."

Next year he wrote:—"I have only found two of the Common Herons' nests this year, and both on the 14th April; each contained three fresh eggs.

"The nests, which measured about 14 inches in diameter and about 5 inches in depth, were loosely built of keekur and sheeshum twigs and scantily lined with straw and leaves. The one was placed on a peepul, the other on a burgot tree, and both were at a height of about twenty-five feet from the ground."

Major C. T. Bingham writes:—"I found this bird breeding near Delhi at the end of March. There were some twenty nests on large trees in and about the village of Burari on the Jumna. I only managed to procure two eggs and these hard-set; the rest of the nests contained young. The nests were mere platforms of sticks."

Colonel Butler, writing from Sind, remarks :—“ Mr. Doig and I found large numbers of Common Herons breeding in the E. Narra, Sind, at the end of July 1878. The breeding-ground consisted of a dense thicket of tamarisk-trees, extending over several acres of ground in the middle of a large dhund, and in it Herons, Egrets, Cormorants, Snake-birds, &c., innumerable, had collected to breed. At first we experienced some difficulty in collecting the eggs we wanted, as the instant the birds left their nests, flocks of Crows descended and carried the eggs off ; but at last a happy thought struck us, to arm ourselves with a good supply of the commoner kind of eggs we did not care about and use them as missiles, and in this way we soon drove all of the Crows away. The nests of all of the species I have mentioned were of the usual stick type, varying in size according to the species they belonged to, and extremely numerous, being built at heights varying from 3 to 15 feet from the surface of the water. The Herons and Egrets seemed to breed together promiscuously, but the Snake-birds, Cormorants, White Ibises, and Shell-Ibises built in separate colonies. The eggs, which vary immensely in size, were mostly fresh and three seemed to be the usual number. Mr. Doig informed me that in another part of the Narra, where the water had risen earlier, he found eggs of this and some of the other species at the end of June.

“ I noticed a quantity of Common Herons breeding in a dense bed of tall bulrushes on the side of a tank at Milana, 18 miles east of Deesa, in August 1876. They appeared to have young ones, but the rushes were so dense and growing in such deep mud, that we could not enter the bed to examine the nests. I mention this fact as I see Mr. Hume’s experience (Nests and Eggs, p. 611) is that they *always* build on trees.”

And from Sind Mr. Scrope Doig adds the following note :—“ This Heron and the Purple Heron I found breeding in July and August in company with hundreds of Egrets, Snake-birds, Cormorants, &c. The nests of this Heron were made of sticks, and were situated in dense tamarisk-jungle growing in the middle of the swamp. The normal number of eggs laid by the Common Heron was found by me to be four, but several nests had as many as five.”

In Ceylon, according to Colonel Legge, this Heron breeds between November and March.

The eggs of this species are too well known to require much description. They vary much in shape and in size, but are typically nearly perfect, moderately broad, ovals ; very spherical and very elongated varieties are common, and pyriform and very pointed eggs are met with. The shell is firm, rather coarse, and entirely glossless. In colour they are a delicate sea-green or bluish green, very thickly set all over with excessively minute pores, which are generally either white or filled with a white substance, the desiccated droppings of the birds I believe. During incubation and after being kept for some time, especially if exposed to the light, the colour fades much.

The pores are more or less conspicuous in different specimens. In some they are so numerous and closely set as to produce the appearance of a faint white mottling over the whole of the egg, while in others they are scarcely noticeable.

In length the eggs vary from 2·08 to 2·48, and in breadth from 1·48 to 1·79; but the average of seventy eggs is 2·27 by 1·66.

*Ardea purpurea*, Linn. *The Purple Heron.*

*Ardea purpurea*, Linn., *Jerd. B. Ind.* ii, p. 743; *Hume, Rough Draft N. & E.* no. 924.

The Purple Heron breeds all over the country wherever swamps and rushy jheels are to be found.

According to my personal experience it lays in July and August, but in the neighbourhood of Saugor Mr. F. R. Blewitt obtained the eggs in April, May, June, and July.

I have seen now some hundreds of nests of this species, and have invariably found them in thick beds of reeds and bulrushes.

Generally from ten to thirty pairs build in the same spot, but occasionally smaller parties are met with. I have never found them nesting in company with other Herons, and in a large jheel where I found both this species and the Night-Heron breeding in similar situations, the Night-Herons had their clump to themselves and the Purple Herons theirs.

Four is the regular number of eggs, but I have repeatedly taken five.

The account given in the following old note that I extract from my diary is pretty well equally applicable to all the many heronries of this species that I have seen:—"On August 16th, 1867, when Mr. Brooks and I were out egg-hunting in the Etawah District, we came across a large herony of this species near the Lohya Bridge of the Ganges Canal.

"In the midst of a large jheel or swamp, in many places grown up with rushes and wild rice, in others with deep and comparatively clear water thickly paved with leaves of the lotus and water-lily, stood two large dense clumps of bulrushes. As we passed within about a hundred yards of these, firing once or twice at Ducks, Nukhtahs, Grey Ducks, and the lesser Whistling Teals, we saw some thirty or forty long necks make their appearance among the waving tops of the bulrushes. It was quite clear that the owners of the necks must be standing on something well above the level of the water, and so we at once sent men to search the clumps,—no easy matter as it proved. It turned out that these Herons, by bending down thirty or forty of the rushes crossing each other in all directions, had made small platforms from eighteen inches to two feet above the water, and on them had built their nests.

"The nests were large, from two to two and a half feet in diameter, loose flat structures, composed of sticks and twigs of the babool and sheeshum (which composed the bulk of the neighbour-

ing trees), with a very slight central depression, in which without any lining the eggs were laid.

"It was clear that they built from choice in this situation, as many large trees were standing round them on which most of the other species of Heron would certainly have built. The eggs were nearly without exception fresh. Two nests contained five, others four, and the rest a lesser number. There were about twenty couple, and we took forty-six eggs. The note of this bird is less harsh than that of the Common Heron ; still, the uproar was great whilst the men were robbing the nests, and the extraordinary chattering that they made, condoling with each other when on re-occupying their nests they found them empty, was most comical."

Mr. Scrope Doig writes from Sind :—"Their nests, made of sticks, were on tamarisk-trees in dense jungle in the water ; the usual number of eggs in a nest was four, but in some cases there were five."

And Colonel Butler, re'ating his own and Mr. Doig's experiences, says :—"On visiting the E. Narra, Sind, with Mr. Doig on the 22nd July, 1878, we found one or two tamarisk-thickets, standing out in the water of a large dhund like islands, swarming with Purple Herons and numerous other species of the same family that had just begun to lay. In other parts of the Narra that had become inundated earlier, Mr. Doig found nests at the end of June ; but some of the colonies we observed were only building when we left the district at the end of July. In one or two instances when the nests were examined before the birds had laid, they deserted the breeding-ground, carrying every stick of their nests off with them."

And he adds :—"I found two colonies of Purple Herons numbering 20 or 30 pairs each at Milana, 18 miles E. of Deesa, on the 21st August, 1876. The nests were good-sized stick structures, and built in a large bed of high bulrushes on the top of the rushes. Unfortunately every nest contained young birds, some three, some four. On the following day, 22nd August, I found a single nest in an isolated clump of bulrushes growing in another tank, containing four incubated eggs, which with considerable difficulty I managed to blow."

Colonel Legge remarks of the breeding of this species in Ceylon :—"I have found this Heron nesting on the shores of Bolgodde Lake, in the Western Province, in December, and on the tanks in the south-east of the island in February and March. It breeds in other similar localities throughout the island. The nests in the first-named place were made on huge screw-pines (*Pandanus*), the leaves being beaten down at the origin of a branch, so as to form a platform on which the eggs were laid ; in the latter district the nests were buil of sticks on bushy, thorny trees growing in a partly-dried tank near the celebrated temple of Tissa Maha Rama.

"Around this tank and in similar trees growing in its muddy bottom, hundreds of Herons, Ibises, Cormorants, Darters, Egrets, Spoonbills, and Pelicans were nesting, and the din of the thousand

cries and screams of these huge birds, as they circled in the air and re-circled and dashed round our heads, combined with the splendid sight they themselves presented, filling the air and lining the trees in long rows on the topmost branches, united to form such a scene as can only be witnessed at these great breeding colonies, scattered about, few and far between, in the wildest parts of our island."

Mr. Oates writes from Pegu:—"The Sittang river at a place near Myitkyo takes a sudden turn to the west for five miles and then turns again to the east for the same distance, thus forming a peninsula about 5 miles long and 2 miles broad. The whole of this area is one vast dismal swamp, the chief feature of which is a gigantic reed called *Kyu* by the Burmese. This swamp in the rains becomes the resort of myriads of birds. It is possible to enter the swamp only during the highest floods, for otherwise the reeds offer too great a resistance to a canoe, and at the best the progress by poling is not more than 200 or 300 yards an hour. What wonders the interior of the swamp could reveal I cannot say, for I have never been able to penetrate it more than half a mile.

"The numbers of nests of all sorts met with is marvellous. In pushing along the young fall, and eggs roll, into the canoe, and in some parts there must be a nest either of a Heron, Bittern, or Cormorant on every square yard of reeds. Three nests frequently touch each other.

"The most numerous species is perhaps the Purple Heron. It constructs a nest of sticks and the broken branches of the reeds about a foot in diameter and eight inches deep, nearly flat at top, and lays four or five eggs. The nest is placed about four feet above the water, resting on three or four reed-stems which they or the wind have bent towards one point. I took eggs on the 7th July and 1st August, but cannot state the extreme limits of the breeding-season."

The eggs of this species closely resemble those of the Common Heron, but taken as a body they are considerably smaller, more pointed, and paler-coloured than those of that species. With these exceptions every description of the latter applies equally to the eggs of *A. purpurea*, and individual eggs of each species may be selected that are altogether undistinguishable.

The eggs vary in length from 1.95 to 2.46, and in breadth from 1.42 to 1.75; but the average of twenty-one is 2.17 by 1.56.

### Herodias alba (Linn.). *The Large White Egret.*

Herodias alba (Linn.), *Jerd. B. Ind.* ii, p. 744.

Ardea egretta, *Gm.*, *Hume, Rough Draft N. & E.* no. 925.

The Large White Egret breeds pretty well all over the country, but is in most places numerically scarce as compared with the two other White Egrets.

I have only found its eggs in Upper India in July and August, but I believe that in Southern India, like many other species, it breeds in December.

They build loose flat ragged structures of sticks and coarse twigs (with no lining and with a very slight central depression) on large trees, mostly (in Upper India) on tamarinds, neem, and mangoes.

They always breed in company with others of the tribe.

Three is the ordinary number of eggs I think, though I have once or twice found four.

The following account by an anonymous writer, sent me I do not know by whom, in regard to the nidification of this and many other of the following species, at one of their large breeding haunts in Southern India, gives a good idea of how these birds congregate:—

“ About fifty miles from Madras and twelve miles from Chingleput in a south-easterly direction is a small village, called Vaden Thaugul, which means literally ‘ Hunter’s Rest,’ from *vaden* ‘ hunter’ and *thaugul* ‘ rest.’ To the south of the village lies one of those small tanks called ‘ Thaugul’ by the Tamil ryots, implying a water-rest or temporary reservoir, from which the village derives its name.

“ The Vaden Thaugul tank is situated north north-west of the Carangooly Fort, and is three and a half miles distant in a direct line from the Great Southern Trunk Road.

“ The bund, whose greatest height is twelve feet, commences from a piece of high ground near the village, runs for a distance of about six hundred yards in a south-easterly direction, then takes a sharp turn almost at a right angle, and terminates in high ground about two hundred yards further on. The waterspread is limited on the north-east by slightly rising ground overgrown with low jungle, and on the east south-east by high gravelly and rocky ground. The area comprised in the tank is about thirty-five acres.

“ From the north-east to the centre of the bed of the tank there are some five or six hundred trees of the *Barringtonia racemosa*, from about ten to fifteen feet in height, with circular, regular, moderate-sized crowns, and when the tank fills, which it does during the monsoons, the tops only of the trees are just visible above the level of the water.

“ This place forms the breeding resort of an immense number of Water-fowl,—Herons, Shell-Ibis, Ibis, Water-Crows or Cormorants, Darters and Paddy-birds, &c., make it their rendezvous on these occasions.

“ From about the middle of October to the middle of November small flocks of twenty or thirty of some of these birds are to be seen coming from the north to settle here during the breeding-season. By the beginning of December they have all settled down; each tribe knows its appointed time, and arrives year after year with the utmost regularity within a fortnight later or earlier, depending partly on the seasons. They commence immediately by building their nests or repairing the old ones preparatory to depositing their eggs. When they have fully settled down, the scene becomes one of great interest and animation.

"During the day the majority are out feeding, and towards evening the various birds begin to arrive in parties of ten, fifteen, or more, and in a short time the trees are literally covered with bird-life: every part of the crown is hidden by its noisy occupants, who fight and struggle with each other for perches. Each tree appears like a moving mass of black, white, and grey, the snowy white plumage of the Egrets and Ibises contrasting with, and relieved by, the glossy black of the Water-Crows and Darters and by the grey and black plumage of the Shell-Ibises.

"The nests lie side by side touching each other, those of the different species arranged in groups of five or six, or even as many as ten or twenty, on each tree.

"The nests are shallow, and vary in inside diameter from 6 to 8 inches, according to the size of the bird.

"The Ibises do not build separate nests, but raise a large mound of twigs and sticks shelved into terraces as it were, and each terrace forms a separate nest; thus eight or ten run into each other. The Shell-Ibises sometimes adopt a similar plan.

"The whole of the nests are built of sticks and twigs, interwoven to the height of 8 or 10 inches, with an outside diameter of 18 to 24 inches; the inside is slightly hollowed out, in some more and in others less, and lined with grass; reeds and quantities of leaves are laid on the nests. In January the callow young are to be seen in the nests. During this time the parent birds are constantly moving on the wing, backwards and forwards, in search for food, now returning to their young loaded with the spoil, and again, as soon as they have satisfied their cravings, going off in search of a further supply. About the end of January or early in February the young are able to leave their nests and scramble into those of others. They begin to perch about the trees, and by the end of February or the beginning of March those that were hatched first are able to take wing and accompany their parents on foraging expeditions; and a week or two later, in consequence of the drying-up of the tanks in the vicinity, they begin to emigrate towards the north with their parents and friends, except perhaps a few whose young are not as yet fledged, and who stay behind some time longer. Thus in succession the different birds leave the place, so that it is completely deserted by the middle of April, by which time the tank also becomes dry; and the village cattle graze in its bed or shelter themselves under the trees from the scorching heat of the mid-day sun, while the cow-boys find amusement in pulling down the deserted nests."

I have seen scores of similar breeding-places in Upper India, but these are always occupied with us in July and August. Can it be that any of the birds that breed in the south in December and January breed again with us in July? Certainly, during the cold season one does not see a tithe of the birds about Etawah, say, that are to be seen during our rainy season.

Major Bingham remarks:—"I found two or three nests of this large Egret in July near 'Reya-ka-tal,' eight miles from Allahabad."

Colonel Butler writes:—"Mr. Doig and I found large numbers of this Egret breeding in the E. Narra, Sind, at the end of July 1878. The nests were scattered about promiscuously amongst the nests of numerous other species and not built in separate colonies."

Colonel Legge says:—"In Ceylon it breeds in company with other Egrets and Herons near tanks and inland waters throughout the wildest parts of the low country. I found it nesting, thus, at Uduwila tank, near Tissa Maha Rama in the south-east. The nests were made of sticks and quite flat and placed on the lateral branches of low thorny trees. The number of eggs was three or four; colour, uniform pale greenish blue; axis 2 inches, diameter 1.39." And he adds that the breeding-season is December, January, and February.

Mr. Oates writes from Pegu:—"Almost every tope of mango-trees forms a breeding-place for these birds, which commence to build nests about the middle of June.

"They also breed in large quantities in the swamp at Myitkyo, making a similar nest to that of *A. purpurea*, and frequently the two nests are in contact with a small Cormorant's next door."

The eggs are of the true Heron type, exactly similar in texture of shell and colour to those of *Ardea cinerea* and *A. purpurea*; but, as a body, slightly smaller than those of either of these species, and on the whole perhaps more elongated in shape.

In length they vary from 1.88 to 2.38, and in breadth from 1.4 to 1.6; but the average of a dozen, which is all I have by me, is 2.11 by 1.55.

### *Herodias intermedia*, van Hass. *The Lesser Egret.*

*Herodias egretoides* (Temm.), *Jerd. B. Ind.* ii, p. 745.

*Ardea intermedia*, van Hass., *Hume, Rough Draft N. & E.* no. 926.

The Lesser Egret is generally distributed throughout India, and breeds in the northern portions of the continent in July and part of August, and apparently in the southern portion of the Peninsula which receives the north-east monsoon in December.

It invariably breeds in colonies, generally in company with many other kinds of Herons, Ibises, &c.

This species, *B. coromandus*, and *A. grayi* commonly breed in towns. The way they pack in their breeding-places at times is astonishing. In the new city of Etawah there was a small Mahomedan graveyard in which stood a few old tamarind-trees, and on these in my time, that is to say from 1856 to 1866 (most probably they do the same to this day), hundreds of each of the three species above-mentioned used every year to breed. On one tree we counted one hundred and ninety-eight nests (and a precious job we had to count them), the greater number of which were occupied. On one nearly horizontal bough we counted in a length of 21 feet eighteen nests, all side by side on the flat surface of the

bough, with barely room in most cases for one bird to stand between two nests, and with no room at all in some. We computed that on these few trees not less than seven hundred pairs of birds had nests. The three species did not appear to have quarters of their own in this herony, as I have often noticed in others, but were all jumbled up together indiscriminately. Year after year I watched them; they began to repair or build their nests after the first good downpour of the rainy-season, that is, some time between the 1st June and the 1st July; the first eggs were laid within a fortnight, and in another three weeks almost every nest had its full complement of four eggs.

The nests are precisely of the same type as those of the preceding species, but are smaller (on the average I should say a little less than a foot in diameter and 3 inches in thickness) and are composed of more slender twigs. Generally they are unlined; sometimes they have a thin lining of sedge and coarse grass.

Major C. T. Bingham remarks:—"I have found the nests of this bird both at Allahabad and at Delhi in July and August. They sometimes breed in company, sometimes alone on a tree by themselves. Nests on loose platforms of sticks with a thin lining of grass on which the eggs, usually four in number, lie."

Colonel Butler, referring to Sind, says:—"Mr. Doig and I found an enormous colony of this species breeding in company with many other kinds of Herons, Egrets, Cormorants, &c., on the 24th July, 1878, in the E. Narra, Sind.

"The nests were built in a dense tamarisk-thicket growing out in the water at heights varying from 3 to 10 feet above the level of the water."

And writing from Deesa, he remarks:—"I found several large colonies of the smaller Egret breeding in high bulrushes in company with *Ardea purpurea*, on the 21st August, 1876, at Milana, 18 miles east of Deesa. The nests, like those of the Purple Heron, were composed of dead sticks and built on the top of the rushes. Several pairs of *N. nycticorax* rose out of the rushes also when my men entered to take the nests, but the coolies declared that they had no nests. The nests of the other two species, *A. purpurea* and *H. intermedia*, were mixed indiscriminately, not built in separate colonies."

In Ceylon, according to Colonel Legge, this Egret breeds from December to April, and even to May.

The eggs of this species are typically very perfect and rather broad ovals, but many eggs are perceptibly compressed or pointed towards one end, and elongated and pyriform varieties occur.

They are of course of the true Heron type already described, but the shells are, I think, somewhat finer than those of either of the three preceding species, and taken as a body they are of a decidedly paler sea or bluish green than those of any of these latter. In size they are intermediate between the eggs of *H. alba* and *H. garzetta*.

In length they vary from 1.68 to 2.08 inch, and in breadth from 1.32 to 1.52; but the average of thirty-seven eggs is 1.9 by 1.44.

*Herodias garzetta* (Linn.). *The Little Egret.*

*Herodias garzetta* (Linn.), *Jerd. B. Ind.* ii, p. 746.

*Ardea garzetta*, *Linn., Hume, Rough Draft N. & E.* no. 927.

Of the nidification of the Little Egret there is little to be said. They breed in company with the two preceding and other species, make precisely similar but smaller nests, and lay very similar eggs, but rather more of them, as I have repeatedly found five and even six in a nest of this species.

With us on the north the breeding-season is July and August, but in the south of the peninsula it would seem to be December, while in Ceylon it would appear to be April.

Layard gives the following account of one of the breeding-places of this and other kindred species in that island. He says:—"Halfway between Tangalle and Matura is a large lake, which an official attendance on the Supreme Court of Judicature fortunately enabled me to visit. While the court officers halted for the heat of the day, I set off on horseback from the rest-house and galloped to the village, having sent forward my *fidus Achates*, Muttu, overnight with orders to prepare me a boat. This was in waiting when I arrived—a canoe so narrow that I could not sit in it, or rather on it, with my knees together. To remedy this defect Muttu had fastened a bottomless chair over it, and had woven some coir-robe across the chasm.

"The canoe, the only one to be had, was about twelve feet long, worm-eaten throughout, and one end gone entirely, its place being supplied with a piece of fresh turf to keep out the water! Into this I and Muttu and a steersman got, the villagers pushed us off, and when fairly afloat I found the top of the gunwale about three inches from the water, and that my frail vessel leaked in fifty places.

"From my elevated position I counted one, two, three, a dozen alligators, and I anxiously enquired of my black and all-but-nude crew if they were of the harmless kind. A shake of the head and the word 'Alliekimboola' by no means reassured me; it meant they were all man-eaters!

"I looked at my boat, then at the loathsome reptiles floating around me, then at my boat again: it would not do. I must give it up, the risk was too great; the least sudden thoughtless move might overset us. I tried the outrigger with my foot—that was firm; the nigger knew his safety lay there. 'Crack' went the collecting-gun close to my ear, and down came a specimen of *Nycticorax griseus*, a bird until then new to me; this turned the scale, and I ordered the boat forward; thousands of water-birds rose at the report, and soon the guns were busily employed. It was full breeding-season. Herons, Spoonbills, Ibises, Pelicans, &c., swarmed in the air and on the trees, while their nests were so crowded as to touch each other.

"I could only get a few of those nearest the lake; up to them the men climbed from the boat, not daring to venture into the water, which was alive with alligators watching for the young birds which fell from the nests; several times they snapped up the birds which I shot before I could get them, though they only fell fifteen or twenty yards away. The branches of the trees were white with droppings, and the water below thick and putrid; the stench was intolerable. It was with difficulty I could distinguish one nest from another, so as to be certain of the parentage of the eggs; but by remaining quiet I marked a bird to its nest, and then rowed up to it, robbed it, and then lay-to again. The nests seemed to be used year after year, if one may judge from the masses of sticks of different ages of which they were composed. My guide also confirmed this idea, and said the birds were not particular as to the nest—one species occupying it one year, another the next perhaps.

"Unfortunately most of my eggs were hard-set. I was there at the beginning of May. In shape they are equal at both ends and very rounded; they are also all of the pure pale-blue colour."

Colonel Butler writes from Sind:—"Mr. Doig and I found this species breeding in hundreds with other Egrets and Herons on the 24th July, 1878, in the E. Narra, Sind. The eggs, varying from 4 to 5 in number, were mostly fresh. The breeding-place consisted of a dense tamarisk-thicket, several acres in extent, that had become partly submerged by the rise of the Indus, looking like a large island in the middle of an immense dhund; and in the upper branches of these trees, sometimes only four or five feet from the surface of the water, the nests were built in countless numbers. I fancy that the birds of this family in this part of the country never leave their nests when once they have laid until the eggs are hatched, as we always found them on their nests, and the moment they rose on our approach flocks of Crows descended and carried off every egg they could find, and it was only by arming ourselves with eggs of some of the commoner species that we did not want and using them freely as missiles that we were able to secure the few eggs we wanted for ourselves."

Mr. Davidson informs us that in Western Khandesh the breeding-season of this Heron is April.

Mr. Oates notes from Pegu:—"In most parts of Burma this bird makes its nest in trees; but near Myitkyo, in the swamp already mentioned under *A. purpurea*, it builds among the reeds, making a nest of small sticks about one foot in diameter. It breeds in July and August."

The eggs of this species are precisely similar in most respects to those of the last-described species, but they are decidedly smaller, and very pale bluish-white varieties, approaching the coloration of those of *Bubulcus coromandus*, are much commoner amongst them.

In length they vary from 1.6 to 1.85, and in breadth from 1.25 to 1.38; but the average of twenty-eight eggs is 1.73 by 1.32.

**Demiegretta gularis (Bosc). The Western Reef-Heron.**

Demiegretta asha (Sykes), *Jerd. B. Ind.* ii, p. 747.

*Ardea gularis*, *Bosc, Hume, Rough Draft N. & E.* no. 928.

The Western Reef-Heron is found as a permanent resident along, and in the neighbourhood of, the whole western coast of India from Soomeanee Bay to Cape Comorin, and up the eastern coast as far as Paumben (further up I have not yet certainly traced it), and in Ceylon.

Mr. Layard has recorded that this bird occurs in the Jaffna estuary and a lake near Chilaw; and he says:—"The eggs are of a pale blue colour; in shape a rounded oval. Axis 1.83; diameter 1.42. The nest is a huge structure of sticks placed in trees by the water-side. Incubation goes on in May and June in the Chilaw Lake. Eggs said to be from four to six in number."

Nests said to belong to this species, pointed out to me on the mangrove trees in Karachi Harbour, were very moderate-sized stick nests in the tops of the mangrove bushes, perhaps at most 5 or 6 feet above high-water level.

Colonel Butler has sent me the following interesting note on the breeding of this species:—"About the 9th May, 1878, my friend Mr. Nash, Telegraph Dept., kindly, at my request, sent a boat to Kalmat, a creek about 20 or 25 miles N.W. of Ormarra on the Mekran coast, overgrown with mangrove bushes and running several miles inland, where small colonies of the present species and a white Egret about the same size, which I believe to be merely the white variety of this species, were breeding in company with a few Pond-Herons (*A. grayi*). The nests were described as being of the usual Egret type, composed of twigs of mangrove bushes and lined with green leaves of the same tree, the whole being about a foot in diameter.

"The eggs, varying in number from 3 to 5, have a peculiarity in some instances which I have never observed in the eggs of any other Egret, and that is, if examined very closely, they exhibit two different shades of colouring, which is produced by the pale bluish-green colour of the lower surface showing through the paler blue upper surface in small patches, and looking as if the outer blue covering had been rubbed off in places. In many eggs it does not exist, and where it does exist it requires very close scrutiny and a good light to observe it; but, as I said before, I believe it to be a peculiarity confined to the eggs of this species.

"Knowing of a clump of mangrove bushes, in the Karachi Harbour, where these birds bred last year, I wrote and asked my friend Capt. Bishop to visit the place at the beginning of May this year (1878), and the result was he procured a nice series of fresh eggs, all of which were taken between the 8th and 21st of the month, after which date all of the nests contained either young birds, or eggs too far gone to blow. Four was the greatest number of eggs in one nest.

"In this instance, as in the one above, the white and blue birds were breeding together, in company with a few Pond-Herons (*A. grayi*). The nests were similar to those already described, except that many of them looked like old nests repaired for the occasion.

"On the 3rd May, 1878, a few more eggs were taken on Waarba Island, Khore Abdulla, at the head of the Persian Gulf, and the man who took them for me described the nests as platforms of twigs, about  $1\frac{1}{2}$  ft. high, neatly built *on the ground*. This unusual site would be explained by the total absence of any kind of trees or vegetation on the island for the birds to build upon, and on account of its being in a place where human beings are almost unknown. The nests contained three fresh eggs each. In this instance there were no white birds, only the blue variety.

"My reasons now for arriving at the conclusion that the white and blue birds are the same bird in different varieties of plumage are as follows:—First, they breed together in the same localities, viz. mangrove swamps, and at the same season; second, that *Herodias intermedia*, the only other species that the white bird could well be mistaken for, does not breed in this part of the country I believe before July; third, that the eggs of the two varieties are inseparable, and both exhibit the peculiarity of colouring I have pointed out above. Then, again, *A. intermedia* resorts to the large dhunds inland to breed, and breeds in immense colonies, in company with other Herons and Egrets, and it is hardly likely that a few odd pairs would breed along the coast about two months before the proper time for the sake of the company of *Demiegretta gularis*.

"There is one circumstance, however, that I must mention that rather argues in favour of the white and blue birds being separate species, and that is, in Mr. Nash's letter he says:—'Out of the numerous incubated eggs brought in, many of which were too far gone to blow, and all of which were carefully marked, we found that all of those marked Blue Egret contained *dark* chicks, and all of those that were marked White Egret contained *white* chicks without a single exception.' The men who took the eggs say that incubation only lasts for seven days, which is probably explained by the extreme heat and the moist climate. This they proved by visiting the place twice; the first time the nests all contained fresh eggs, and the second time, *seven* days later, many of them contained young birds, and most of the remaining eggs were too much incubated to blow. It will be observed that these Herons lay about the same time all along the coast, viz., about the first week in May, and so punctual are they that unless the nests are visited within about the first half of the month there is very little chance of procuring fresh eggs."

In shape the eggs vary but little; they are all very regular moderately elongated ovals, but whereas the majority have the two ends obtuse and almost precisely similar, in a few there is a slight tendency to point at both ends. The shell is hard and compact,

but not fine, and has no gloss whatsoever; in colour it is a uniform delicate sea-green, very much like that of *A. grayi*.

In length the eggs vary from 1.72 to 2.01 and in breadth from 1.28 to 1.41.

**Demiegretta sacra (Gm.). *The Eastern Reef-Heron.***

*Ardea sacra, Gm., Hume, Rough Draft N. & E. no. 928 bis.*

Within our limits we only as yet know of this Reef-Heron's breeding in the Andamans and Nicobars, the Tenasserim and Arracan coasts.

In the Andamans it lays from the middle of April to the middle of June, a little earlier or later according to the time the monsoon sets in.

Mr. Davison remarks:—"At the Andamans, at least in Port Blair and its immediate vicinity, it is not nearly so abundant as it is at the Nicobars. At the Andamans it breeds on a small islet of Corbyn's Cove, South Andaman. This islet is low and rocky, and is partially covered at high tide. About the centre it rises into a rugged crag, about fifteen or twenty feet high, full of crevices. It is partially covered with coarse grass, and out of one side grows a stunted ragged tree. In the crevices and in some of the larger branches of the tree these birds build their nests, which are simply platforms of sticks with only a slight depression for the eggs. In the early part of May there were six nests on the island, but I only obtained one egg; the birds had not laid in the others, though they had apparently ceased building. The vicinity of these nests had a very disagreeable fishy smell. All the Herons I saw on this island were the dark ashy ones, and one that was caught on her nest was also of the dark variety. At Trinkut Island the natives told me that they built their nests on the cocoanut palms."

Capt. E. R. Shopland writes that on the 19th May he had occasion to visit Oyster Island, off the Arrakan coast, and that he found eight or nine nests of this Reef-Heron in a patch of thorny jungle near the centre of the island. The nests were from one to three feet from the ground, and were composed of dead sticks and leaf-stalks. No nest contained more than three eggs. The colour of the eggs was light green, and they measured on the average 1.76 by 1.28 inch."

To judge from those taken by Mr. Davison and others sent me by Captain Wimberley, which were taken somewhat later in the year, the eggs are of the ordinary Heron type, moderately elongated ovals in shape, the shell rather coarse, much pitted with minute pores, and entirely glossless. The colour is a uniform very pale sea-green. They have of course no markings or spots of any kind, though as incubation proceeds they get more or less stained and tinged with brownish soils. They vary from 1.59 to 1.85 in length, and from 1.25 to 1.33 in breadth. The average of seven eggs is 1.7 by 1.3.

**Bubulcus coromandus (Bodd.). The Cattle-Egret.**

*Buphus coromandus (Bodd.)*, *Jerd. B. Ind.* ii, p. 749.  
*Ardea coromanda (Bodd.)*, *Hume, Rough Draft N. & E.* no. 929.

The Cattle-Egret breeds throughout the Empire, except in absolutely waterless and almost rainless tracts. In Upper India it breeds from June to August in the rainy-season, which there is brought by the south-west monsoon, but in those parts of Southern India which mostly get their rains in the north-east or winter monsoon, it breeds in November and December. In Ceylon it breeds in April and May, and probably in the case of all these Herons some birds may be found in one part or other of the country breeding in every month of the year.

As a rule, the Cattle-Egret breeds in company with the White Egrets and the Pond-Heron. Sometimes, however, a colony of them may be found breeding alone.

They always, so far as my experience goes, breed upon trees, tamarinds being, I think, their favourites in Upper India, and very commonly on trees about village ponds, and they make the usual stick nests and lay four or five eggs.

Mr. Adam says, writing from the Sambhur Lake:—"The Cattle-Egret is very common about this. It breeds in June and July. In a village close to Sambhur I found a breeding-place in which some hundreds of birds had their nests."

Colonel Butler remarks:—"The Cattle-Egret breeds in the neighbourhood of Deesa in July and August. They are later in breeding than *Ardeola grayi*. I found a colony in the middle of the Suddur bazaar at the end of the camp, on the 18th July, 1876. There were in all about twenty or thirty pairs, and the nests were about a yard apart, sometimes even closer, placed on the same low trees upon which the nests of *A. grayi* were built that I robbed earlier in the season (May 26th). The eggs were mostly fresh. The nests are exactly the same as those of *A. grayi*.

"Mr. Doig and I found large colonies breeding in the E. Narra, Sind, during the last week in July, 1878, in company with other Herons and Egrets. The eggs, distinguishable at a glance from all other Egrets that breed with us by their very pale colour (almost white), varied in number from three to five, and were nearly all fresh."

Major Bingham, writing both of this species and of *Ardeola grayi*, says:—"Two birds whose nests I have seen in greater numbers than those of any other Indian bird. They breed very commonly both at Allahabad and at Delhi in July, August, and September."

And Mr. George Reid informs us that near Lucknow he found numerous nests in August, mostly occupied by young birds.

Writing from the Deccan, Messrs. Davidson and Wenden say:—"Numerous during rainy and cold seasons. D. knows two places in the Sholapoor collectorate where it breeds in the hot weather."

The eggs of this species are, as a body, distinguished from

those of all our other Indian Herons with which I am acquainted by their very pale colour. In other species, and specially in *H. garzetta*, pale varieties occur, but in this species the eggs are always pale, and I have never yet myself taken a deeply coloured one. I have seen eggs of a rich sea-green attributed to this species, but in my opinion erroneously so. These birds breed in company with various other species, and, unless the nests are very carefully watched, mistakes as to the parentage of the eggs are sure to occur. I have taken certainly two hundred of the eggs of this species with my own hands, and they were one and all white with a faint blue or green tinge, recalling in tint the eggs of *Astur badius* or *Butastur teesa*. The eggs vary much in size and shape, but are typically rather broad ovals, somewhat pointed towards one end. Some eggs are, however, a good deal elongated, some are pointed at both ends like those of a Grebe, and some eggs are obtuse and symmetrical at both ends. The texture of the shell is compact and fine, differing in no appreciable respects from that of the other small Herons' eggs.

In length the eggs vary from 1·6 to 1·85 inch, and in breadth from 1·22 to 1·4; but the average of thirty-two eggs, now in my collection, is 1·71 by 1·32.

**Ardeola grayi (Sykes). The Pond-Heron.**

*Ardeola leucoptera (Bodd.)*, *Jerd. B. Ind.* ii, p. 751.

*Ardeola grayi (Sykes)*, *Hume, Rough Draft N. & E.* no. 930.

The Pond-Heron, perhaps one of the very commonest and most familiar birds in India, breeds everywhere throughout the empire.

Dr. Jerdon says:—"It breeds on trees, sometimes alone, sometimes several on the same tree, making a rough nest of sticks and laying four or five pale greenish-blue eggs;" and if we add that it often also breeds in company with many of the preceding species, that it not unfrequently lays six eggs, and that these are not typically pale, but pretty deep greenish blue, there is little, I think, left to be said."

With us in Upper India they lay chiefly in July and August, and in Southern India within the range of the north-east monsoon in December apparently.

Colonel Butler writes:—"The Pond-Heron breeds in the neighbourhood of Deesa in the months of May, June, July, August, and September. I found a large colony breeding on neem trees in the Deesa bazaar on the 26th of May, 1876. The nests were usually built upon the small branches of the trees, and consequently somewhat difficult to get at. They were small and built of dead sticks loosely put together, looking like old Crows' nests, generally three or four on one tree, sometimes more, sometimes less. I found many more nests later on in June, July, August, and September, but in the latter month they nearly all contained young birds. Most of the nests I examined contained three eggs, but in a few instances there were four."

In Western Khandesh, says Mr. Davidson, this Heron "breeds from May to July along the Panjra and probably elsewhere."

Colonel Legge, writing from Ceylon, says that "the Pond-Heron breeds in the south of the island in May and June, commencing to lay about the end of the former month; it chooses a lonely spot, such as an island in a lake, to form its colony. In such a place on a large sheet of water between Galle and Matara, on the 15th of June, 1871, I discovered a Herony. The nests were built on a low bushy tree called in Singalese 'Cadol,' a species of *Rhizophora*, and the only kind of tree on the islet. In some trees there were five or six nests; they were constructed of twigs or small sticks, and placed in the forks of branches; there was but little hollow in them for the reception of the eggs, and no lining; in fact, they resembled massive Pigeons' nests. In most there were three, in others two, and in a few four eggs. Colour, pale bluish green; average dimensions of a number of specimens—axis, 1.57; diameter, 1.18. At this time a few young were hatched, and a fortnight later I found numbers out; they were to be seen standing up in the nests and, when molested, scrambled along the thin branches, perching on these twigs with the greatest care. In the very young nestling the bill is fleshy red, and legs and feet bright pea-green."

Mr. Oates writes from Pegu:—"I have taken eggs of this species as early as the 31st May, and some at this date were well advanced towards hatching. Most birds frequent trees, but a few apparently nest in the reeds at Myitkyo, though I did not see the nests."

The eggs of this species are slightly elongated ovals, generally perceptibly pointed at one end and not unfrequently at both ends. Pale varieties are uncommon in this species. As a rule, they are a pretty deep sea-green or greenish blue, and when fresh darker and greener as a body, I think, than those of any of the other small Herons. In most collections that I have seen, the eggs of these various Herons are much intermingled, owing to the habit of numerous species breeding together, not only on the same trees, but even on the same branches, nest touching nest; but where a large series of eggs of each species have been carefully taken, each will be found to possess a certain character of its own, and in some, as in the present and preceding species, this is well marked.

In length the eggs vary from 1.35 to 1.62 inch, and in breadth from 1.1 to 1.25; but the average of fifty-five eggs is 1.48 by 1.17.

**Butorides javanica (Horsf.). The Little Green Bittern.**

*Butorides javanica (Horsf.).* *Jerd. B. Ind.* ii, p. 752; *Hume, Rough Draft N. & E.* no. 931.

The Little Green Bittern is generally, though sparingly, distributed over the whole country, and is, so far as I have observed, a permanent resident where it occurs. It therefore probably also

breeds all over the country in its favourite haunts, the more or less tree-overshadowed banks of canals and streams (rarely jheels), where it lurks during the heat of the day in low bushes, clumps of rush or brushwood, or pendent leafy branches overhanging the water, only as a rule making its appearance in the mornings and evenings, stealthily skulking along the water's edge.

A nest I once found was in a clump of reed and rush outside the Western Jumna Canal, a few miles from Paneput, on the 21st July. It was partly supported on the twigs of a dead sunken babool branch, and partly on rushes bent down over this, forming a little platform about 2 feet above the water's edge. It was a small stick nest, perhaps 8 inches in diameter, with a perceptible depression in the centre, and contained three perfectly fresh eggs. The bird rose from the nest within twenty feet of me, but not knowing there was a nest there I did not fire at it, but my man who was searching the rushes found it a few minutes later before I had moved from the spot, and then came and pulled and pushed the rushes aside so that I could see it plainly.

Colonel G. F. L. Marshall remarks:—"I found this species breeding in the Muttra District in August; on the 30th I found a nest in a keekur tree at the edge of a jheel near the canal, on a horizontal branch, about twenty feet from the ground. It was a very slight structure of sticks. There were three young ones nearly fledged, which had left the nest and were creeping about among the thorny branches, but quite unable to fly."

Mr. Doig writes from Sind:—"The Green Bittern is very common in certain portions of the Narra. In one clump of young babool trees about three hundred yards square I found fifteen nests, the number of eggs varying up to five. The birds make a very peculiar noise, between a hiss and a squeak, when on their nest, and in several instances the noise has betrayed to me the vicinity of the nest. I got their eggs from the 29th June up to the middle of August. The nest was very much in size the same as a Pond-Heron's, and as a rule in dense tamarisk or babool jungle in water."

And Colonel Butler, referring to the same part of the country, says:—"Mr. Doig and I found nests in the E. Narra on the following dates: 30th June a nest containing one fresh egg, 27th July a nest containing five slightly incubated eggs, 28th July a nest containing five chicks and another containing three incubated eggs. All of these nests were found in dense thickets of tamarisk-trees growing out in a dhund."

Mr. G. Vidal, writing of the South Konkan, remarks:—"Common and widely distributed both inland and on the coast. On the 15th April, 1878, I have found a nest in a thorny bush, a few feet from the ground, on the banks of a small creeklet running into the Savitri river. The nest was a small stick platform, very shallow, with only a slight depression. Two fresh eggs of the usual *eau de nil* colour were secured. In shape they were almost pure ovals,

measuring about  $1\cdot62 \times 1\cdot18$ . On the 20th April following, another nest, with one fresh egg, was found in a similar situation."

The eggs are very uniform in shape and size, moderately broad, often slightly cylindrical ovals, normally quite symmetrical and obtuse at both ends, occasionally a specimen is met with showing a tendency to point at one or both ends. The shell is extremely fine and compact; it has no gloss, and is of a uniform pale sea-green; held up against the light, the shell is an extremely bright sap-green.

A large series of eggs vary in length from  $1\cdot4$  to  $1\cdot64$ , and in breadth from  $1\cdot08$  to  $1\cdot23$ .

**Ardeiralla flavigollis (Lath.). The Blue Bittern.**

*Ardetta flavigollis (Lath.)*, *Jerd. B. Ind.* ii, p. 753.

*Ardea flavigollis*, *Lath.*, *Rough Draft N. & E.* no. 932.

The Blue Bittern probably breeds over the whole Empire in suitable localities.

Writing of the nidification of this Bittern in Sind, Mr. Scrope Doig says:—"In January last, Captain Butler in Upper Sind, and I in these districts, both about the same time, thought we saw this bird. On the 4th May, however, I shot a pair and saw some dozen more, since then I have found them in three different places very numerous. Once the sun is well up, they are seldom seen unless actually beaten out of the dense tamarisk and reed jungle in which they lie hid. My plan was to go out some time before daybreak and paddle up in my canoe into the middle of the swamp, and hide in some bunch of rushes and wait till daylight. As day began to dawn birds of various kinds began to appear returning from the scenes of their night's dissipation; some came along in flocks making a great noise, apparently quite satisfied with their night's work; others came flitting silently along the top of the reeds, as if they were very much ashamed of themselves for being out so late. Among the latter were *A. sinensis*, *A. minuta*, and *A. flavigollis*.

"By remaining hid I could mark down the different thickets into which the birds disappeared, and when I thought the birds had all returned I began searching one thicket after another. In this way I got numerous nests, in each case taking the eggs myself and flushing the birds off the nest. The nests are formed of tamarisk-twigs, with sometimes a few aquatic weeds on which the eggs are laid; they are generally placed about 5 feet over the water, either in a dense tamarisk-bush or thick clump of weeds, and are about 9 inches in diameter, 3 inches thick, and have a very slight depression in which the eggs, always four in number, are laid. The eggs are for the most part very broad ovals, sharp at both ends, and very nearly white in colour, but with a faint suspicion of a delicate pale sea-green colour. The eggs vary in length from  $1\cdot5$  to  $1\cdot85$ , and in width from  $1\cdot15$  to  $1\cdot30$ , the average length of fifty-three eggs being  $1\cdot66$ , and width  $1\cdot26$ ."

Mr. Oates remarks :—“ Breeds commonly in Lower Pegu. On 25th July found a nest near the top of a bamboo bush where several branches met and formed a strong platform. Composed merely of dry stalks and leaves of coarse grass and of indefinite shape ; four eggs nearly hatched ; colour pale green, with no gloss when fresh, but becoming shiny as incubation proceeds, when the ground-colour is barely visible owing to the dirt on the egg. On July 26th another nest on a mass of thorny bushes in a paddy-field ; three eggs, quite fresh. Dimensions of five :—1·61, 1·56, 1·68, 1·66, 1·61, by 1·2, 1·22, 1·25, 1·24, 1·25, respectively.”

The eggs of this species, received from Mr. Oates, are broad ovals of the usual Heron type. The ground-colour is white, with very faint green tinge. Where incubation has been continued for any length of time, the eggs have become soiled and overlaid with a dingy yellowish-brown tinge.

**Ardetta cinnamomea (Gmel.). *The Chestnut Bittern.***

*Ardetta cinnamomea (Gm.)*, *Jerd. B. Ind.* ii, p. 755.

*Ardea cinnamomea*, *Gm.*, *Hume, Rough Draft N. & E.* no. 933.

The only nest of the Chestnut Bittern I have myself seen, I found on the 27th July, in the Botanical Gardens, Calcutta, where I was at the time living. The garden coolies had brought my friend, Mr. J. C. Parker, five or six eggs of this species, of which there are numerous pairs about the gardens, and which (the Herons, *not* the gardens) the people call Lall-bâg, and this led me to search for some for myself. After repeated hunts I found a nest on the bank of one of the tanks in the midst of dense rushes containing three fresh eggs. The nest was propped up on the roots of the rushes, about 2 inches off the ground, was about 7 inches in diameter and 2 in thickness, with only a slight central depression, and was composed of rush and grass, and lined with rather finer grass.

From Tipperah my friend the late Mr. Valentine Irwin sent me seven eggs and noted as follows :—“ I have now taken two nests of the Chestnut Bittern. The one which I took on the 30th May contained four fresh eggs. The nest was made of the leaves of reeds in short pieces. It was nearly flat, an inch in thickness, and placed in a cane-bush near the water’s edge in a tank. The other, which I took on the 5th June, contained three fresh eggs and was composed of short pieces of grass and reed laid on the ground, at the roots of some water-plants in an old tank. In both cases I myself saw the female bird sitting on the eggs before I took them, and in the case of the first nest I shot her as she flew off, and now send the skin with all the eggs.”

Mr. Brooks, writing from Etawah, says :—“ On the 24th August, 1869, five eggs were brought to me and described as those of a red-coloured *Gallinula* or Water-hen. These eggs strongly resembled those of the Little Bittern, *Ardea minuta*, which bird I endeavoured to describe to Ungun, the boy who had taken the eggs, but

he said it was quite another bird which flew from the nest, being entirely of a light reddish colour.

"The next day I went to the place, which was a pond of about an acre in extent, covered with tall reeds, and with a patch of open water about twenty yards square. After beating the reeds in the vicinity of the nest one of these red birds came out, but out of shot from the place where I stood.

"This I at once saw was no *Gallinula*, for it flew to a tall castor-oil plant growing at the side of a sugar-cane field and perched on the top of it. I endeavoured to get within shot, but it was too wary and flew away to a distance. The other bird came out on the opposite side of the pond and flew away a hundred yards or so and returned to the pond. I again had the reeds beaten after I had gone to the other side of the pond, and this time the bird came out past me, a long 45-yards shot for No. 8 shot, but I managed to secure it. It was, as I expected from the egg, a Little Heron or Bittern, *Ardea cinnamomea*.

"I observed that the nest of this bird was built about 2 feet above the water-level on some reeds which had been bent down for the purpose. The nest was composed of water-grass and lined with coarse grass. The eggs were pure white with, when fresh taken, a very faint tinge of blue. In shape they were a perfect oval.

"On the 4th September among some patches of reed on Jheenjuck Jheel, I again put up an *Ardea cinnamomea*, which I unfortunately shot. The nest was close by and contained only one fresh egg. The bird was the male, and the female flew off. The nest was, as before described, a platform of grass among the reeds, and placed on a few which were bent down. It was about 2 feet from the water surface and about 9 inches in diameter. It was quite flat without any central depression. The egg in colour and form resembled those formerly taken, but it is rather larger."

Mr. Scrope Doig, writing from the Eastern Narra in Sind, informs us that he "found a nest of this species on the 3rd August in a thick clump of reeds in the middle of a swamp; it contained four fresh eggs. The nest was a platform of coarse grass and reed."

Colonel Butler notes from Belgaum:—"20th July. Found a Chestnut Bittern's nest containing four slightly incubated eggs. The nest, which consisted of a tolerably substantial pad of short pieces of coarse, damp sedge lined with small pieces of dry grass, was built upon a small plot of rising ground in the middle of an inundated corn-field. The island was overgrown with grass, 2 or 3 feet high, and weeds, and the nest was built in the grass about a foot from the ground, and some 9 or 10 feet from the water's edge. I visited the spot upon two different occasions and both times the hen bird was sitting and the cock bird was skulking in the grass close by. The eggs were very dirty, being covered all over with mud from the bird's feet and stains from the damp materials of which the nest was composed, and it took a considerable amount

of washing and scrubbing to restore them to their normal colour, which seems to be almost pure white.

“ 24th July. Found a nest containing two fresh eggs in a bed of dense bulrushes growing in the middle of a small tank. The nest was composed of a pad of coarse pieces of damp sedge and placed in dense rushes about 2 feet above the water-level, the rushes being beaten down for it to rest upon. The female bird rose straight off the nest as the beaters approached it. On re-visiting the tank on the 8th August a fortnight later I found another nest precisely similar about 10 yards from the one taken on the 24th July, containing three slightly incubated eggs. There were two pairs of birds in the rushes, but in all probability, as there were only three eggs in the second nest (four or five being the usual complement), both nests belonged to the same pair of birds.”

And he found more nests up to the 6th Sept., on which date a nest contained four slightly incubated eggs.

Captain E. R. Shopland, I.M., records the following note from Calcutta:—“ From an overhanging bush by the long tank close to Bishop’s College on 6th July I took the nest of a Chestnut Bittern containing three eggs hard-set; the nest was composed of grass and flat rush laid across, 8 inches in diameter and no depression in the centre; it was about 4 feet above the water.

“ I took another nest of the above species on 17th July containing four fresh eggs in the middle of a bed of rushes standing in 2 feet of water; nest 5 feet above the water and placed on a lot of rushes which have been bent down and interlaced. The nest was entirely composed of this rush split up and in lengths of 8, 9, and 10 inches.”

In Ceylon, according to Colonel Legge, this Bittern breeds in June and July.

Writing from Pegu Mr. Oates says:—“ Usually lays five eggs, but I have found six occasionally. Nest on ground in swampy places, a mere pad of green grass; Lower Pegu. July 26th, six eggs slightly incubated. July 30th, five eggs fresh. August 10, four eggs fresh. August 19th, five eggs much incubated.

“ Eggs measure in length from 1·36 to 1·21 and in breadth from 1·1 to ·98. The average of 20 eggs is 1·28 by ·99. The colour is dull white without gloss and the shell is very smooth to the touch. Fresh eggs, before being blown, are decidedly pink, the contents showing through the shell.”

The eggs of this species resemble closely those of the Little Bittern. They are dull white, sometimes with a very faint bluish tinge, often with no perceptible trace of this. The texture of the shell is very fine and compact, but there is no gloss. In shape the eggs are broad regular ovals.

Of all our Indian Herons with whose eggs I am acquainted those of *Bubulcus coromandus* approach nearest to those of the present species, but pale as is the tint of the Cattle-Heron’s eggs, it is quite pronounced, as compared with that of any of the eggs of the Chestnut Bittern that I have seen.

In size the eggs vary a good deal, from 1.2 to 1.42 in length, and from 1 to 1.1 in breadth, but the average of twenty-three eggs is 1.31 nearly by 1.04.

**Ardetta sinensis** (Gmel.). *The Little Yellow Bittern.*

*Ardetta sinensis* (Gm.), *Jerd. B. Ind.* ii, p. 755; *Hume, Cat.* no. 934.

The late Mr. Valentine Irwin sent me an egg of this species from Comillah, Tipperah, and wrote:—"I have got a nest of the Yellow Bittern. On the 28th June I was searching some rush and reed at the edge of a tank, about two miles distant from here, for Rails' and Water-cocks' eggs. I found one or two common nests, but got tired and came out on the bank, and I was just changing my boots &c., when my shikaree called out from a clump of rush, which I had only left a couple of minutes previously, that there was a Paddy-bird on her nest. I went in as I was,—no trousers, no boots,—and there, sure enough, doubled into the smallest imaginable space, was a Yellow Bittern on a little rush-and-reed nest built on the top of a small mud pillar, which projected about 6 inches above the water-level, and which was entirely surrounded by a dense growth of that round sedge Snipe so affect in the cold weather. I stood within two feet of her, but she did not fly off till I put out my hand to seize her, and then she flapped off, uttering a queer little chuckling, chattering note, and settled on the top of a net stake about twenty-five yards off. The nest contained five dull, dingy, white eggs: three of them were already cracked, the other two I took, and, as soon as we had got about twenty feet away from the nest, the old bird, which had never ceased croaking and squacketting, flopped back on to the nest and immediately became as still as a mouse. The eggs were just like those of the Chestnut Bittern, but rather smaller and rounder I think. I broke one egg in trying to extract the young; the other, wreck as it is, I send."

Colonel Butler writes:—"I found two or three pairs of the Yellow Bittern at Milana, 18 miles south-east of Deesa, during the rains, breeding in a dense bed of tall bulrushes by the side of a small tank. They are not easily flushed, and when flushed they fly somewhat rapidly along the top of the rushes, dropping into the reeds again after a short flight. The following extract is taken from my nesting memoranda: 'On the 21st August, 1876, at Milana, I found a nest of the Yellow Bittern. It was built of sedge and rushes near the outside of an immense bed of tall bulrushes, in one of which it was placed about two feet above the level of the water. It was a small nest and not unlike that of a small Rail, and contained three eggs, but unfortunately so near hatching that I only managed to extract the contents of one of them. The eggs are long and cylindrical, in fact, much in shape like Nightjar's eggs, about  $1\frac{1}{4}$  inch in length, and white, faintly tinted with pale skim-milk blue.' I think there can be no doubt

of the identity of the eggs, as there were two pairs of the birds in the clump of rushes in which I found the nest, a single bird rose close to the nest, and there was no other bird to be found anywhere near the tank that the eggs could possibly have belonged to. On the 24th instant I found another nest exactly similar in every respect, but built in a clump of bulrushes growing quite on the outside of the bed. The bird rose off the nest within a yard of me, but there were no eggs, and when I returned a few days later the nest was deserted. I only saw about three pairs of the birds altogether, one of which I shot, and a fortnight later when I visited the ground they had all disappeared, so that probably they only remain here during the rains."

Mr. Scrope Doig, writing from the E. Narra, Sind, says:—"This Little Bittern is very common here during the hot weather: I have found their nests in May and again in August. Five is the usual number of eggs in one nest. The nest is sometimes situated in the centre of a tussock of grass, or in a bunch of reeds growing in the centre of a tamarisk-bush in the water, and two nests I found in the middle of some rushes; the tops of the rushes had been bent down and tied together, forming a little platform, about three feet over the water, and on this the eggs were laid. Several nests which I found containing one egg I left, returning some four days after expecting to find five eggs, but in each case I found the nest deserted and the egg gone. One nest, which was in the middle of a lot of rushes and was found by my man, contained two eggs; I went with him the next day to see the nest, hoping it might be one of *A. minuta*; to my disgust on getting to the nest I found the eggs smashed and the parent bird (female) lying dead on the nest, and half eaten. What could have killed the bird I cannot say. The eggs of this Bittern are very nearly spherical in shape, and are, when first blown, of a delicate pale sea-green, but after a time they get almost white. They vary from 1.15 to 1.25 in length, and from .90 to .95 in width, the average of 21 eggs being 1.19 in length and .95 in breadth."

Mr. Oates has the following note on the breeding of this Bittern in Pegu:—"Common as this bird is, its nest is one of the most difficult to find, and when found, to secure. It selects the matted leaves of immense reeds, and places its nests on the summit where wind and rain have entangled the leaves and worked them into a platform. The nest itself is a mere pad of dry grass and leaves.

"I have only taken one nest, which contained four eggs. They are without gloss and a pale green colour. They measure 1.26, 1.31, 1.3, and 1.28, by .95, .95, .97, and .93 respectively. They were found on the 20th August and were fresh."

The eggs are small, regular, symmetrical and sometimes somewhat cylindrical ovals. The shell is extremely fine, smooth, and has a slight gloss; the colour is a very delicate greenish white.

Numerous eggs vary from 1.2 to 1.39 in length by 0.88 to 1.0 in breadth.

*Ardetta minuta* (Linn.). *The Little Bittern.*

*Ardetta minuta* (Linn.), *Jerd. B. Ind.* ii, p. 756; *Hume, Rough Draft N. & E.* no. 935.

The Little Bittern breeds in several parts of the Himalayas in rushy-bordered lakes and swamps, at elevations of from 3000 to 7000 feet. It also breeds in Sind. In Cashmere at the Wullur, Anchar, and other lakes it breeds abundantly, and it also breeds, I know, having found the nest there with young, near Syree on the Simla Road.

It lays in June. Four is the usual, and five the maximum, number of eggs. It appears always to build in amongst rushes or wild rice, and to place its nest sometimes on the ground, but more generally on a little platform a foot or so above the water's level, formed by bending down the rushes or reed *in situ*. The nest itself is slight and flat, composed of reed and rush loosely put together, 6 or 7 inches in diameter and from an inch to two inches in thickness. This, however, I state mainly on the evidence of the native collector I sent to Cashmere, as I have only myself seen one single nest.

The late Major Cock sent me the following note:—"Breeds in large numbers among the reeds and rushes that fringe the various Cashmere lakes during May and June. It makes a flat-shaped nest of dried rushes attached to four or five reeds growing out of the water and at a height from the water of about one foot. Two or three days spent in wading about among these reeds rewarded me with several nests. Six eggs was the usual number; pure white in colour. The birds never sat close, but were always off the nest before I came up to it."

Mr. Scrope Doig writes from Sind:—"Last year, though Captain Butler and myself several times searched one of the swamps here, we never came across the Bittern or *A. flavigollis*. This year, in the same swamp, there are numbers of both. I took my first nest of this bird on the 26th May; it contained four fresh eggs. They are elongated ovals, sharp at both ends, and pure white. The eggs vary from 1.3 to 1.4 in length and from 0.95 to 1.05 in width, the average of seven eggs being 1.34 in length and 1.00 in breadth."

The eggs of this species closely resemble those of *Ardetta cinnamomea* and *A. sinensis* (although perhaps they average rather smaller than those of the former and larger than those of the latter). They are moderately broad ovals, pure white, and entirely glossless. The shell is fine, but is closer pitted all over with minute pores, giving it in a bright light a somewhat rough appearance. As incubation proceeds, the eggs get much soiled and discoloured.

The eggs I have vary in length from 1.23 to 1.41, and from 0.97 to 1.05 in breadth.

*Nyctiardea nycticorax* (Linn.). *The Night-Heron.**Nycticorax griseus* (Linn.), *Jerd. B. Ind.* ii, p. 758.*Nyctiardea nycticorax* (Linn.), *Hume, Rough Draft N. & E.* no. 937.

I believe that the Night-Heron breeds pretty well all over the Empire, alike in the plains and in the North-western Himalayas up to an elevation of 6000 or 7000 feet.

Common as is this species in many parts of the country, it is rarely seen in broad daylight unless one chances upon one of its hiding-places, usually some completely leaf-enshrouded bough, overhanging some stream or pond; but after sunset they may often be noticed, at times solitary, more usually in small parties, winging their way pretty high in air towards some feeding-ground, with a straight moderately rapid flight, uttering as they go, at short regular intervals, a single sharp note more like a quack, it seems to me, than a croak, as it is usually designated.

In the plains they breed in July and August, but in Cashmere, Mr. Brooks says, in April and May. They build both on trees and in reed-beds; but I have only thrice found the nests, so cannot say which of those situations they commonly affect. When the nests are on trees they are more substantial, and more and larger sticks are used in their construction than when they are placed in rushes and reeds. I could see nothing to distinguish their nests from those of all the other members of the family.

They lay four or five eggs; but we found one nest in a gooler-tree near Juggernathpoor on the 21st August containing six, and all the eggs of this nest were very round and much below the usual average size.

Dr. Jerdon says that the Night-Heron "breeds on palms, tamarisks, and other trees *in society*," and this I believe to be the usual rule. It is curious that each of the three nests that I have seen were solitary.

Mr. Brooks writes to me:—"One of the breeding-places of this bird is a clump of fine *chenar* or plane trees adjoining the Shalimar Gardens, near Sirinuggur in Cashmere.

"These gardens are on the west border of the Sirinuggur Lake, and, as well as I remember, are about four miles from the city. Their elevation is the same as Sirinuggur (5000 feet).

"I visited this place about the 24th of May, and found a good number of the Common Heron (*Ardea cinerea*) breeding in the trees, and about eighteen pairs of the Night-Heron.

"Nearly all the pairs of both species had newly-hatched young; but a few pairs of each had eggs, of which the greater part were deeply incubated, but a few were fresh.

"The nests of the Night-Heron were very similar to those of the Common Heron, but smaller; being composed entirely of sticks and twigs in the form of a simple platform, frequently so scanty that the eggs could be seen through the nest from below. As well as I remember, the greatest number of eggs or young in any nest of either species was three.

"The eggs of the Night-Heron were smaller and of a more elongated shape than those of the Common Heron, and were of a purer and lighter green. Both of these Herons breed much earlier in Cashmere than in the plains of India.

"Another breeding-place of the Night-Heron which I found out was at Muniah Ghât, on the bank of the Ganges, halfway between the Tonse River and Allahabad. -

"The trees in which they bred were about a dozen tamarinds close to the Muniah village. One side of the clump was occupied by a colony of *Ardea alba*, while the other belonged to the Night-Herons. There were about a dozen pairs, and they had fresh eggs in the beginning of August, or three months later than the breeding-time in Cashmere.

"I have only noticed these two breeding-places of the Night-Heron, but without doubt it breeds generally over North-western India in suitable localities, *i. e.* in well-watered districts. I should observe that in every instance in which I have found the breeding-place of Herons or Egrets in India, the trees chosen were close to native houses."

Colonel Butler writes:—"Mr. Doig and I found a large colony of Night-Herons breeding in the E. Narra, Sind, at the end of July 1878, in a dense tamarisk thicket, several acres in extent, in the middle of a large dhund, in one part of which a few clumps of tall bulrushes were growing, and in these and the adjoining trees the nests were built. Herons, Egrets, Cormorants, and Snake-birds were building in hundreds all round, but the Night-Herons had formed a separate colony. At the time we visited the place (24th), the birds were mostly building, but subsequently about a week later our man took any number of eggs."

Mr. Oates records the following note from Pegu:—"This bird breeds in immense quantities in the swamps at Myitkyo. I have not taken the eggs because it was simply impossible, among the mass of birds, to authenticate the eggs properly. This bird flew off before the nest could be seen, whereas many of the other species allowed the canoe to approach pretty near before going away. July and August may, however, be considered the months in which they lay. The nests do not differ from those of *A. purpurea* and *H. alba*; for I saw only one type of nest all the time, and many must have belonged to the present species."

The eggs vary very much in shape and size. Typically, I think, they are much of the shape of a hen's egg, but some again are considerably elongated, and here and there a specimen approaches the Cormorant shape. Typically, they are rather obtuse at both ends, but many are decidedly pointed, and some are more or less pyriform towards one end. The colour is a delicate pale sea-green, but some, when fresh, are a decidedly bright, though light green, and here and there an egg is to be met with so pale that it is scarcely more than greenish white.

In length they vary from 1.68 to 2.06, and in breadth from 1.3 to 1.45; but the average of eighteen eggs is 1.92 by 1.35.

## Family CICONIIDÆ.

*Leptoptilus argala* (Lath.). *The Adjutant.*

*Leptoptilus argala* (Linn.), *Jerd. B. Ind.* ii, p. 730.

*Leptoptilos dubius* (Gm.), *Hume, Rough Draft N. & E.* no. 915.

Of the nidification of the Adjutant in India proper not much is known. I only know of its having been found breeding in the Soonderbunds and in the north of the Goruckpoor District. They lay in November, making a huge stick-nest upon large trees, as a rule, in localities difficult of access.

Mr. R. W. G. Frith, as quoted by Mr. Blyth, informs us that he "found both of the species of Adjutant breeding in the south-east part of the Soonderbunds. Their nests were placed on the tops of the loftiest trees, and were extremely difficult and hazardous to approach from the density of the undergrowth and the great number of tigers which infest the vicinity; in fact, the nests were only to be approached by means of the tracks made by rhinoceroses, buffaloes, &c., through the jungle. The large or pouched species breeds about a month earlier in the season than the other, immediately (it would seem) after its arrival from the places which it frequents during the rainy season. They are then in the finest state of plumage—ash-grey, with the pale wing-band complete, and for the most part they have just perfected their plumage when they leave Calcutta at the end of the rains."

The late Mr. Robert Morell, I may add, informed me that the Adjutants bred on large trees in the midst of dense jungle in the immediate neighbourhood of his own fine estate of Morellgunj in the Soonderbunds.

The late Captain Beavan remarked:—"The nest of this species has been observed in India by a near relative of my own, Lieutenant-Colonel Charles Drury, of the Bengal Staff Corps. It contained two young ones, and was found by him at Munsoor Ghât (in the north of the Goruckpoor District but not in the Terai) on a high bank, near a stream, on or about the 15th December, 1861. The old birds were put off the nest, which was on a semul or cotton-tree, and a shot fired into the tree made the young birds, which were fully fledged, come out and sit on one of the boughs, whence one was bagged by another shot."

From Burma, however, we have much fuller information regarding the breeding of this Adjutant.

Mr. Blyth quotes the following remarks of Captain Sparkes on the nidification of this species:—"With regard to the Adjutant's nest, I was out surveying in December 1848 in the district of Moulmein, at a place about five miles to the east of the town, and having occasion to ascend some eminence to obtain a good *coup d'œil* of the surrounding country, I determined to climb to the top of the highest peak of the Kharong Hills, a detached mass of lime-

stone rock which rises almost perpendicularly out of an extensive level plain to the height of 600 feet. The ascent was extremely difficult and dangerous, and had never before (so the people assured me) been attempted by a European. On gaining the summit I found that I was immediately over the top of a large tree which sprang from a crevice in the rock below, and on its highest branches was an Adjutant's nest, composed of dry sticks very rudely interlaced (or merely heaped together ?), making a flat platform as it were, with little or no perceptible cavity towards the centre. In this were two young Adjutants, about the size of small Geese, covered with a white down and with pouches and beaks ridiculously disproportioned to their size, being extraordinarily large. Both of the young were taken by one of my Burmese servants. In another similar nest in an adjoining tree were one young one and one addled egg of a *spotless dirty white*, and somewhat larger than a Turkey's egg."

Colonel Tickell tells us that "on the Ataran River a range of perpendicular rocks of mineral limestone rise sheer out of the water to 600 or 800 feet on the right bank of the river, and some extraordinary, bold, scarped, insulated rocks are scattered also along the opposite side. On the pinnacles of these rocks we observed numbers of Adjutants. These large birds breed here annually, and the rocks are in many places conspicuously white with their dung. There are two species of Adjutant—*Leptoptilus argala* (our old Calcutta friend) and *L. javanicus* (a rarer visitor in Bengal)—and both breed together in these inaccessible places. The *argala* is noticeably larger than the other, but eggs of the two species are hardly to be distinguished apart."

Mr. Oates found an enormous colony of these birds breeding in Pegu in a forest west of Shwaygheen. He says :—

"Along with the Pelicans, breeding in the same trees, were innumerable Adjutants. One can hardly realize the number of these birds that visit Pegu in October, unless, as I have, he has seen the vast armies which settle on the plains on their first arrival. I have stood on a bund where I could see about two miles round me, and the whole area was literally covered with them. Some fifty birds stand huddled together; then there is a bare space of about 100 feet, and then another group of birds. Their numbers are incredible. They all arrive suddenly in the Pegu plain on the same day, and after resting for about two days, they betake themselves to the forest, where I had the pleasure of visiting them. Certainly almost all the Indian Adjutants must come to Pegu to breed.

"On the same day that we took the Pelicans' eggs, we also paid attention to the Adjutants, but whereas in the case of the Pelicans by climbing one tree you procure almost as many eggs as you care to have, with the Adjutants it is different. Frequently there is only a solitary nest in a tree, rarely two or three, and in this case the tree selected is a stupendous one, with immense branches reaching 50 feet from the trunk and mostly horizontal. These nests are not to be got at even by Karens. Fortunately the nests

are so frequent that there is no difficulty, in the course of a morning, in finding accessible ones in plenty.

"November 11th was a trifle too early. Many nests were still being built; others had no eggs in them, and only a few had the full complement of three eggs.

"The nest is made entirely of coarse sticks, and it is of such a size that the sitting bird cannot be seen from below, except when she stretches her head out. It is wedged into a fork as near the exterior of the tree as possible, whether at the top or side.

"The eggs, three in number, are originally pure white and tolerably, in some specimens very, smooth to the touch. As incubation proceeds the shell gets much stained and becomes a dark earth-brown. The interior lining is very dark green. They are very regular ovals, much the same shape at both ends. Size from 2.82 to 3.1 by 2.08 to 2.25.

"These Adjutants utter only one sound, and it resembles the lowing of a cow when separated from her calf. It was the only sound heard in these gloomy forests."

Major C. T. Bingham visited a well-known breeding haunt of this bird near Moulmein, and I quote a portion of his interesting account of the trip. He writes:—

"To the south-east of Moulmein, about twenty-five miles up the Attaran River, a low but excessively steep and scarped range of limestone rocks, called the Needong hills, run nearly at right angles to the river on the north bank, and overhanging the water present a strikingly bold and picturesque aspect. On the south bank this range is broken into four or five isolated masses rising abruptly from the surrounding plain.

"In the latter end of November and in December these almost inaccessible cliffs afford safe nesting-sites to the two species of Adjutants, *Leptoptilus dubius* and *javanicus*.

"Last January twelvemonth, while going up the Attaran River on a shooting-trip with a friend, I had seen the Adjutant in immense numbers feeding their young on the topmost pinnacles of these rocks; and, concluding from this that their laying-time must be some time in November or December, I there and then determined to make a raid on their nests at the end of the year. Detained by my duties in the frontier forests till the first week in November, and having on my return to Moulmein a lot of work to do, I began to fear that for this year I should be unable to carry out my project. However, an opportunity at last presented itself on the 27th of November. \* \* \* \*

"As we passed under the hill overhanging the left bank of the river, I was delighted to see the Adjutants in full force, two or three crowning each pinnacle, and here and there through the green foliage showing white against the blue rock. I could see the large guano-soiled masses of sticks which composed their nests. \* \* \* \*

"Having got clear of the paddy, we entered a gently undulating plain covered with dense evergreen bushes and a few small bamboo

clumps. Closer in to the hill we got into a denser and more matted belt of evergreen that surrounded its base, from which the rocks rose abruptly, towering above and hanging over each other in most fantastic shapes. It was with some difficulty we worked round towards the north side of the hill, as besides the thickness and thorniness of the jungle the ground under foot was spongy and moist to a degree. However at last our guide stopped, and pointing to a sort of rough gap between two of the lower large rocks, said this was the spot to attempt the climb—and a very nasty break-neck looking spot it was, and I didn't half like the look of it, all the more because I had foolishly left my ropes at the camp. However, there was no help for it, and my mouth was watering to see the number of Adjutants wheeling above the hills, all or most of which most probably had nests somewhere on the top. \* \* \* \*

"There being no time to lose I took off my coat, tightened my belt, and taking only my gun, already loaded with a cartridge of No. 1 shot in each barrel, and slung on my back to leave my arms free, I requested my Karen guide to lead on. And lead on he did straight up the face of the rock, clinging on to roots and projecting knobs of rock in a marvellous manner. I did my best to imitate and follow, but had several times to shout to him to wait for me ; and was soaked through with perspiration, and blowing like a broken-winded horse before I got to the first nest, which was placed on the flat surface of a block of rock nearly at the top of the hill. A hasty glance at it showed me four eggs resting on a mass of twigs and sticks with scarcely any depression in the centre, and unlined. Below this was a substructure of larger sticks ; the whole mass, and the rock on which it was, whitened by the droppings of the birds ; the eggs, large white ovals, chalky, stained, and dirtied, like as possible to eggs of the Common Vulture (*Pseudogyps bengalensis*). Having secured this prize, I looked around and saw that there were no less than eight other nests in sight, and in these I saw eggs. These also I managed to secure, although the way over the rocks was rough and jagged in the extreme, and once I had to swing myself over a low cliff of about fifteen feet by a root. One nest out of the three contained two eggs, the other two one each ; in these the eggs were fresher and whiter, the nests themselves being similar to the first described. \* \* \* \*

"And now as the sun was sinking rapidly, I had to think about getting down. So stowing three eggs in my pockets and four in my handkerchief, I gave the Karen my gun, which, by the way, I found useless, the Adjutants wheeling about but keeping out of killing range ; however I managed to identify them as *Leptoptilus dubius*, all of the larger kind, and began the descent. But if the ascent was ticklish, this was simply diabolical. Several times I barked my elbows and knees, and twice or thrice stopped to see whether the eggs were not broken. Never was way so long ; but down I got at last, and miraculously the eggs were safe.

How thankful I was I need not say, for I was rather exhausted." \* \* \* \*

Recounting how he went on to another place, he proceeds:—"I had by much questioning ascertained from our guides that the most accessible point was on the south-west side of the hills, which consisted of six or seven peaks joined by a continuous knife-like ridge. Passing the overhanging rocks, we landed as soon as we could find a suitable spot for getting on shore, as the tide was out, and there was a long reach of deep mud to get across. A walk of ten minutes across old deserted gardens overgrown with kyne grass, past a ruined hut, put us at the foot of the hill. \* \* \* \*

"At the top I found three more nests of Adjutants similar to those of yesterday, with eggs. One bird I fired at, but after sailing off apparently unhurt, I saw it fall a long way out in the forest.

"I was much struck by a curious noise the Adjutants made when disturbed, a sort of loud grunting croak, not unlike the low of a buffalo. Slowly I worked my way along the ridge, rapidly filling my basket with plants; and finding several fresh but empty nests of the Adjutants. One pretty brown-spotted yellow orchid I found hanging in a tuft overshadowing one of the nests."

The eggs seem to vary very much in size, and a good deal in shape; normally they are, I think, very perfect symmetrical ovals, almost precisely the same size at both ends; but many eggs are decidedly compressed or pointed towards one end, and comparatively quite elongated, more or less pyriform, examples are met with.

The shell is very stout and hard, and although densely studded with minute pores, that in some specimens are rather conspicuous, it is, for the size of the egg, rather fine-grained, and is quite smooth, in fact rather satiny to the touch, like that of the eggs of *Mycteria*.

When first laid the eggs are pure white, with perhaps a slight greyish-greenish tinge, but very slight. As, however, incubation proceeds they get stained and soiled to a degree, so that most of the eggs when ready to hatch off are a darkish, dingy, mottled yellowish brown.

Numerous eggs vary from 2.76 to 3.26 in length, and from 2.02 to 2.55 in breadth.

### *Leptoptilus javanicus* (Horsf.). *The Lesser Adjutant.*

*Leptoptilus javanica* (Horsf.), *Jerd. B. Ind.* ii, p. 732; *Hume, Cat.* no. 916.

Mr. Oates procured some eggs of this Adjutant in Pegu. He says:—"While taking some nests of *Leptoptilus giganteus*, I sent some of the party to look for accessible trees. They misunderstood me, and finding a tree which could be climbed, instead of waiting for me, a man ascended and took two eggs, which he

brought me as the eggs of the Lesser Adjutant. I failed to see any of these birds myself, but they are common enough in the same forest, for subsequently I procured young birds which I am now rearing. I see no reason to doubt the authenticity of the eggs. I was in the forest only one morning, and might easily have failed to notice this species. In fact the Burmans told me it was too early for them, as they breed later than the Pouched Adjutant.

"The two eggs measure 3·16 and 2·98 by 2·25 and 2·2 respectively. These dimensions are rather larger than the largest egg of *L. giganteus* I procured. In colour they are precisely the same."

Mr. H. Parker, writing from North-west Ceylon, gives the following account of the breeding of this bird:—

"*February to April.*—At length I can give some trustworthy information regarding the breeding of the Hair-crested Stork in Ceylon. A nest was found by three native hunters in February in very dense forest, and the eggs, two in number, were brought to me. Both birds were on the tree, one being on the nest. Subsequently one was shot for me, still frequenting the tree. The nest was a large structure of sticks high up in the tree, and that is all I know of it. The men stated that as the eggs were being taken the birds circled overhead, making a noise like that caused by the vibration of telegraph-wires in a wind.

"The shape of the eggs is a somewhat narrowed oval, slightly pointed at the large end. They are white and closely pitted or granulated, glossless, of a rough, chalky, absorbent texture, and would apparently be soon discoloured; although they were newly laid, one is already considerably soiled by the feet of the bird. Their dimensions are 2·82 by 2·11, and 2·86 by 2·07."

### Xenorhynchus asiaticus (Lath.). *The Black-necked Stork.*

*Mycteria australis*, Shaw, *Jerd. B. Ind.* ii, p. 734.

*Mycteria indica* (Lath.), *Hume, Rough Draft N. & E.* no. 917.

The Black-necked Stork breeds, I believe, pretty well all over the Empire in well-watered tracts, where large lakes, jheels, or swamps are common, but it is nowhere, that I have seen, numerically abundant.

It lays, the time varying a good deal according to season, from the beginning of September to the middle of December, and Mr. Horne took hard-set eggs as late as the 27th of the latter month.

They build upon large trees, very commonly on large peepul-trees, but I have found the nest on sheeshum, semul, and many other kinds.

The nest, always a great platform of sticks, is sometimes enormous; one I found near Badlee was fully 6 feet long by 3 feet broad, and so deep that three fully-fledged young ones just able to fly were able to crouch in it so as to be invisible, even when the nest was looked at from some distance with binoculars.

Usually the nest is from 3 to  $3\frac{1}{2}$  feet in diameter, and with a considerable cavity, not so flat as a Vulture's, but with a deep saucer-shaped depression. It is carefully lined with rushes, grass, pieces of *ban* or grass-rope, water-weeds, &c. One nest that I examined had a regular parapet of mud, the kind of clay we call *chiknee muttee*, all round the margin of the cavity, some 3 inches wide and 2 inches high; and Mr. F. R. Blewitt, who watched the birds building this nest, told me that "the birds took more than a month building the nest, taking immense pains to finish it off. When it was nearly ready they put a sort of rim of clay all round the top of it; the old birds descended alternately to the tank and brought up the mud in their bills, and then standing on the nest, they seemed to manipulate and arrange it with the greatest care with their long bills. These hatched off three young."

But I have now seen scores of nests without ever seeing a second similar example, so that it would appear to be quite exceptional for them to use mud.

Four is certainly the regular complement of eggs, and one of the four is very often bad, so that they much more often rear *three* than four young ones, but I have twice found as many as five eggs in a nest.

In some cases I have known of their using the same nest year after year, but my impression is that they very commonly build a fresh nest each year.

These birds have a most remarkable method of paying delicate attentions, or it may be merely of dancing. A pair will gravely stalk up to each other, and when about a yard or two feet apart will stand face to face, extend their long black and white wings, and while they flutter these very rapidly, so that the points of the wings of the one flap against the points of the other's wings, advance their heads till they nearly meet, and both simultaneously clatter their bills like a couple of watchmen's rattles. This display lasts for nearly a minute, after which one walks a little apart, to be followed after a moment by the other, when they repeat the amusement, and so on for perhaps a dozen times. When I first witnessed this curious play on the evening of the 26th December, 1866, two pairs performing at the same time within 50 yards of each other on a sandy chur of the River Chumbul, I thought of course that the performers were making arrangements for a future generation, or at least that all this parade would end in some such combination; but watching them closely through the glasses from little more than 100 yards' distance I discovered that they never actually touched each other, and after a dozen or more such flutterings they all rose and flew quietly away.

Years ago Mr. Brooks wrote to me from Etawah:—"On the 20th October, 1869, we took three nests, one with four, and two with two eggs each.

"The nests were all on solitary peepul-trees in the middle of plains and in no case near villages, huge stick nests at the tops of trees, lined with grass and long withered water-plants.

“ Whether these were built by the birds themselves or were old nests of *Otus calvus* or *Haliaëtus leucoryphus* is uncertain.” And later he wrote to me that he had never obtained eggs earlier than the 20th October; but the very next year Baboo Kalee Narayn Roy took, within a circle of a dozen miles round Jhujgur, four nests on the 9th, one on the 13th, one on the 14th, and one on the 16th September, all but one of them containing four eggs. The rains had ceased very early, and hence the birds bred early; while in other years when the rains are late, I believe Mr. Brooks is quite right, and that scarcely an egg is to be seen before the middle of October.

Colonel G. F. L. Marshall remarks that this species “ builds a large nest of sticks at the top of a tree, from 20 to 60 feet high, from August to October, earlier in Saharunpoor, later in Aligurh. In the former district I found young and hard-set eggs early in September. In the latter district I took five fresh eggs from a large nest at the top of a peepul-tree fully 50 feet high; while on the 12th I noticed a bird with a stick in his huge bill, awkwardly arranging a habitation on another peepul-tree; the nest was only half finished. They are sometimes walled round with karounda thorn.”

Major C. T. Bingham remarks:—“ I found two nests of this bird in October, one on a large peepul-tree close to the village of Kunkerabad near Mohar, the second station on the East-Indian Railway from Cawnpore. This was a shapeless mass of sticks, with a deep depression in the centre containing four hard-set eggs, on the 8th October. On the 13th of the same month I found a second nest on a large sheeshum tree; this, like the last, was a large platform of sticks, and contained three fresh eggs. I found it near the village of Kundla, 11 miles from Allahabad.”

Mr. George Reid writes that at Lucknow “ on the 15th November last I came across a nest and three half-fledged young ones.”

Colonel Butler writes:—“ The Black-necked Stork breeds in the Narra District, Sind, in September, towards the end of which month Mr. Doig obtained three or four nests containing fresh eggs. It continues laying till the 29th of November if not later, as we took eggs from the 15th September up to that date.”

Mr. Oates notes from Pegu:—“ In the Pegu plain these birds select an isolated tree, and make a large nest near the summit. On the 1st December I took two eggs, and on the 6th January a clutch of four. Young birds reared from the nest are now (June) moulting into the adult plumage.”

The eggs of this species closely resemble those of the Common European Stork and of *Dissura episcopus*, but they are certainly larger than those of the latter, and probably exceed average eggs of the former. In shape they are typically broad ovals, compressed towards one end, so as to have a slightly pyriform tendency; elongated ovals and almost spherical varieties are not uncommon. The eggs are dull and mostly glossless, but, though the texture is

somewhat coarse, they are fairly smooth to the touch. When fresh they are nearly pure white, with only the faintest possible bluish-grey tinge ; but after being a few days in the nest they become soiled and stained, and assume that dingy yellowish-white or pale yellowish-brown tint so characteristic of Stork eggs.

In length the eggs vary from 2·65 to 3·13, and in breadth from 1·98 to 2·3 ; but the average of forty-five eggs is 2·91 by 2·12.

**Dissura episcopus** (Bodd.). *The White-necked Stork.*

*Ciconia leucocephala* (Gmel.), *Jerd. B. Ind.* ii, p. 737.

*Melanopelargus episcopus* (Bodd.), *Hume, Rough Draft N. & E.* no. 920.

In Upper India the White-necked Stork breeds from the latter end of June to the end of August, but in parts of Central and Southern India they sometimes lay as early as March, and in other parts they breed during the winter monsoon. The nests are placed in large trees—peepul, burgot, tamarind, and sheeshum being, I think, their favourites. The nests are rarely above from 20 to 30 feet from the ground, and vary from 14 to 20 inches in diameter, and from 4 to 8 inches in depth. They are densely built of twigs and small branches, and have a considerable central depression, sometimes thinly lined with down and feathers, and sometimes almost filled with straw, leaves, and feathers, in amongst which the eggs are sunk as if packed for travelling. The full number of eggs is four ; rarely three more or less incubated eggs are met with.

Colonel G. F. L. Marshall writes :—“ This species is common in the Saharunpoor District. It breeds upon trees in June and July, making a large rude nest of sticks about 30 feet from the ground, deeply cup-shaped and scantily lined with down and feathers, and lays four eggs of a lengthened oval shape, nearly the same at both ends. The colour varies from pure white to brown, unspotted, and they are in shape very like common Ducks’ eggs. I took three fresh eggs in the latter half of June in the Saharunpoor District, one fresh egg in the beginning of July in Meerut, half-fledged young ones on the 28th of August, and four fresh eggs in the Etah District on the 2nd of September. Some of the nests were on sheeshum and some on banyan trees, but all at the top of the tree.”

Mr. W. Blewitt says :—“ I found several nests of this species in the neighbourhood of Hansie during the latter half of June and the early part of July.

“ They were all placed on peepul or burgot trees, mostly in the neighbourhood of the canal, and at heights of from 20 to 25 feet from the ground. They were densely built of keekur and ber and sheeshum twigs, and thickly lined with straw, leaves, and feathers. They varied from 14 to 17 inches in diameter and from 4 to 7 inches in depth.

"Four was the largest number of eggs found in any one nest, and, as in more than one instance when this number was found, the eggs were more or less incubated, this would seem to be the normal complement."

Writing from Sholapoore District, Mr. J. Davidson remarks:—"I found a nest of the White-necked Stork on the 18th of December; the nest was on the very highest branch of a banyan tree in a grove. It was a broad platform made of small light-coloured sticks. I saw the birds carrying the sticks the day before, so did not expect eggs; but noticing one bird sitting upon the nest, I sent a man up, and we found one egg."

And writing from the Deccan, Messrs. Davidson and Wenden say:—"Common; generally seen in pairs. D. got nests in Sholapoore District in December and January, and observed birds breeding at Satara in February."

Colonel Butler remarks:—"I found a White-necked Stork's nest about 30 miles from Deesa on the 14th October, 1876, containing three slightly incubated eggs. The nest was built near the top of a large tamarind-tree, and looked from below very like a Crow's nest, but larger. The interior was thickly lined with dry grass. The eggs when washed are white, of a chalky nature, and more or less discoloured from incubation. Before being washed they were all covered with dirt from the feet of the parent birds. In leaving the nest one of the old birds (for they were both present) broke one of the eggs, I fancy with its foot. There were two Vultures' nests (*Pseudogyps bengalensis*) in the same tree."

The eggs of this species vary much in shape, but there are three predominant types—the one a regular, somewhat flattened ellipse with perfectly similar obtuse ends; another a broad oval, pointed and pyriform towards one end; and the third a long narrow oval, more or less pointed towards both ends.

The shells are dull and glossless. When perfectly fresh, of a faintly bluish white, but becoming stained and soiled as incubation proceeds, so that an egg nearly ready to hatch is very commonly of a yellowish earthy-brown colour throughout. They are quite devoid of any natural markings. Held up against the light, the shell of freshly-laid eggs is a delicate pale green; while in those which have been long sat upon it is a dingy yellowish green. The eggs, as might be expected, are usually considerably smaller than those of the White Stork, and average somewhat less than those of the Black Stork.

In size they vary from 2.3 to 2.66 in length, and from 1.75 to 1.92 in breadth; but the average of fifty eggs measured was 2.5 by 1.83.

## Order STEGANOPODES.

## Family PHALACROCORACIDÆ.

**Phalacrocorax carbo** (Linn.). *The Large Cormorant.*

*Graculus carbo* (Linn.), *Jerd. B. Ind.* ii, p. 861; *Hume, Rough Draft N. & E.* no. 1005.

The Common Cormorant is abundant enough in all the larger rivers of Upper India, at any rate in those which run through all rocky beds. I have never succeeded in finding their nest or procuring their eggs, but I had some fragments of shells shown me once which, from texture, colour, and size, did probably really belong, as they were said to do, to this species.

At all seasons of the year, except the height of the rains, of which I cannot speak, they are to be found in the Chumbul in that part of its course where it forms the southern boundary of the Etawah District. The local boatmen assured me that the Common Cormorant bred there in April and May on rocky islands or lengthened rocky promontories, generally in amongst the rocks, but sometimes on trees, making a large nest of sticks. It was in the Chumbul that the shells already alluded to were brought to me. A boatman pointed out a ridge of rocks where, he said, he had seen a great number of "jul-kowas" breeding the previous year; and, in the course of poking about this, some half-a-dozen fragments of eggs were found in crevices which certainly looked very much as if they might have belonged to Cormorants, with whose eggs I have been familiar from childhood. I have also been assured that they breed about some rocks in the River Jumna in large numbers, at a place called Mhow-Buriaree some thirty miles above Allahabad.

It breeds commonly enough, however, in many other parts of the Empire.

Writing from Pegu, Mr. Oates says:—"This bird breeds in vast numbers in the Myitkyo swamp, placing its nest in low, apparently dead trees, which rear their heads 15 or 20 feet above the water. I found it impossible to approach the trees quite closely myself, so I sent a Burman, who brought me a basketful of eggs in a few minutes. From a short distance the nests appeared to be made of twigs; but I have often seen these birds dive in the canal and fly off with weeds fully 5 feet long. These, no doubt, enter into the composition of the nest. There were either four or five eggs in each nest. The egg is covered with dirty white chalky matter; when this is removed the shell is a very pale blue. As incubation

proceeds the egg becomes very dirty. I took the eggs on the 4th October, but up to the 27th of that month I observed a great number of birds still carrying sticks and weeds towards their breeding-quarters. The eggs measure in length from 2·3 to 2·6, and from 1·5 to 1·7 in breadth."

Mr. Scrope Doig found a large nesting-place of this Cormorant in the E. Narra, Sind. He writes:—"The breeding-ground was in the middle of a swamp called the Samara Dhund, and the nests were placed on old withered tamarisk-trees standing in water about 8 to 10 feet deep. The nests were large platforms of sticks, about 2 feet in diameter one way, and about 2 feet 6 inches the other way, that is, they were more oval than circular. The eggs were laid on a thin bedding of rush and grass, and the greatest number I got in one nest was seven. Some had only three, others four, five, and six; the latter seemed to be the normal number, though some nests had only four young ones just hatched. It evidently was an old breeding-ground, as I could count three or four old nests under the present ones, so that the nests were sometimes three feet thick. There were no other kind of Cormorants, or in fact any kind of aquatic bird, to be seen in the swamp except a few Pelicans. I was very much astonished to find so many as seven eggs in one nest, but there was no mistake, as I collected them all myself. The nests were only about 4 to 6 feet above water, so that I had nothing to do but stand up in the boat and gather. The total length of the breeding-ground was about one mile by about 80 yards wide."

Captain Horace Terry, referring to Southern India, says:—"Some thirty or forty miles from Bellary there was a large tank near the Madras railway, where we used to go frequently in the cold weather to shoot Duck, and with usually the result of a very fair mixed bag of Duck, Teal, Snipe, Purple Coot, Bittern, &c. We generally went a party of five or six, and took with us a couple of home-made canoes, rather cranky affairs certainly, but still they would float as a rule, and were of great service in keeping the duck on the wing. Near the centre of the tank there were some rocks, and one day, the 17th January, one of the party told me, the Cormorants, several of which were flying about over the tank, were breeding there. I visited these rocks, two in number, the next day, and found I could only climb on to one of them, and there was only one nest with three eggs in it and another with young birds. I could see some four or five nests on the other rock, but could not get at them. I brought away one of the young birds, which I kept alive for some little time, but it died suddenly, I think from foul play; the boy whose business it was to procure live frogs for its maintenance not liking the job."

The eggs are extremely elongated ovals; in some cases slightly pyriform, but as a rule conspicuously pointed towards the small end. The outer layer of the shell, which may be of the thickness of a sheet of paper, is soft and chalky, white when the egg is first laid, but becoming stained, soiled, and embrowned as incubation pro-

ceeds. Beneath this upper chalky layer is an ordinary hard shell of a greenish-blue colour or bluish-green, much as in many of the Herons. They vary from 2·2 to 2·62 in length, and from 1·41 to 1·7 in breadth.

**Phalacrocorax fuscicollis, Steph. *The Lesser Cormorant.***

*Graculus sinensis, Shaw, apud Jerd. B. Ind. ii, p. 862; Hume, Rough Draft N. & E. no. 1006.*

The Lesser Cormorant is certainly very rare in Upper India. Dr. Jerdon says that it is perhaps more generally spread over the country than the Common Cormorant, but this is an entire mistake. I have never yet seen a live specimen, nor have I ever seen a skin from any part of the North-West Provinces north of the Jumna, from Oudh, the Punjab, Rajpootana, or Sind. The only specimens I have received (except from Lower Bengal and the countries eastwards) were sent me from Jhansi by Mr. F. R. Blewitt, who found this species breeding in the environs of large lakes in that district during the latter half of August and the first half of September.

The nests were placed on low trees standing on flooded land, and what at other seasons were the banks of the lakes. The birds were breeding in companies, ten or a dozen nests in the same tree. The nests were moderately large stick structures, and contained, some five, some four, and some a lesser number of eggs, of which he sent me a large supply.

Mr. Oates, writing from Pegu, says:—"This bird breeds in reeds in the Myitkyo swamp alongside the many other birds which are found there. Although the bird is very numerous I came across only one nest with eggs, the rest containing young ones. This was on the 25th July.

"The nest is made of the smaller side-branches of reeds, is flat at top, converging to a point below, about 9 inches across and 6 deep, supported on a few bent reeds. Eggs 5, 1·92 to 2·15 long, and 1·27 to 1·4 broad. Colour as in other Cormorants' eggs."

Colonel Butler sends me the following note:—"Mr. Doig and I found large numbers of this species breeding in the E. Narra, Sind, in company with *P. pygmæus* and *P. melanogaster*, at the end of July 1878, in a dense tamarisk thicket, that had become partly submerged by the overflow of the Indus. The nests were exactly like the nests of the Snake-bird and Small Cormorant, and the eggs also similar to the eggs of these two species but intermediate in size, though scarcely separable from those of the Snakebird."

The eggs are very long ovals, much pointed towards one end, exteriorly a bluish chalky white, but beneath this, where this outer, somewhat friable, covering is removed by accident (as often happens naturally) or design, the real shell is of a pale greenish blue.

The eggs vary in length from 1·98 to 2·25, and in breadth from 1·28 to 1·6; but the average of thirty-three eggs is 2·1 by 1·4.

The eggs sent me by Mr. Blewitt, though unquestionably belonging to this family, strike me as large for this species. The majority of them are nearly, and some of them are quite, as large as those of the Snake-bird; and though the bird itself is by no means *very* much larger than our Little Cormorant, the eggs sent me as belonging to it are fully double the size of those of this latter. I cannot therefore help fearing that perhaps some mistake has been made. The Cormorant and the Snake-birds breed together, at times in the same trees, and the wrong birds may possibly have been shot when the eggs were taken. Further observations are necessary.

**Phalacrocorax pygmæus (Pall.). *The Little Cormorant.***

*Graculus javanicus (Horsf.),* *Jerd. B. Ind.* ii, p. 863.

*Graculus melanognathus (Brandt),* *Hume, Rough Draft N. & E.* no. 1007.

The Little Cormorant breeds all over the Empire, always, as far as my experience goes, on trees in the immediate vicinity of lakes, jheels, or ponds, and very commonly in trees standing well into the water.

In Upper India they lay during the latter part of August and the first week in September. They nest in companies of from five or six to fifty or more pairs. The nests are moderate-sized stick structures, very often old ones of a previous year repaired, and not unfrequently they take possession of those originally built by Crows and Egrets. Very commonly they are found breeding in company on the same tree with the Snake-bird, and occasionally (but rarely) with some of the smaller Herons.

I have noticed that they seem to have a decided preference for nesting in babool trees.

Of the breeding of this bird in Sind, Colonel Butler writes:—“Mr. Doig and I found large colonies of the Small Cormorant breeding in the E. Narra, Sind, in a dense tamarisk thicket in the middle of a large dhund on the 24th July, 1878. The nests were of the usual type and contained fresh eggs, and the birds were breeding in company with *P. melanogaster* and *P. fuscicollis*.”

“In Ceylon,” says Colonel Legge, “it breeds in February and March, on trees by the side of unfrequented tanks, and often in company with *Plotus melanogaster*. Numbers of nests are placed in one tree, and are not large for the bird, being constructed of small sticks, placed on horizontal branches towards their ends. The number of eggs laid at the colony of these birds, at Uduwila Tank, was usually three; they were long and elliptical in shape, and of a greenish white over an inner surface of green, appearing when the egg was scratched.”

Mr. Oates writes from Pegu:—“Incredible numbers of this bird breed in the reeds of the Myitkyo swamps. The water is alive with the young birds which tumble out of the nests. They seem

quite happy in the water, and although some of the birds were certainly not more than a week old they dived readily on my attempting to seize them.

"The nest is made of twigs, and is similar to but smaller than that of *P. fuscicollis*. My eggs were taken on the 26th July and 24th August, but it must commence breeding some weeks before the former date."

The eggs are of the true Cormorant type—long oval eggs, more or less pointed towards one end, with an exterior chalky coating, which, white or bluish white when first laid, becomes, as incubation proceeds, yellowish or yellowish brown, and beneath this a firm, hard, greenish-blue shell. As a rule, more or less of the chalky covering becomes detached in the nest, and it is not rare to find eggs which have naturally lost this coating from more than half their surface.

In length the eggs vary from 1.65 to 1.92, and in breadth from 1.08 to 1.25; but the average of forty-seven eggs is 1.76 by 1.16.

**Plotus melanogaster** (Penn.). *The Indian Snake-bird.*

*Plotus melanogaster* (Gm.), *Jerd. B. Ind.* ii, p. 865; *Hume, Rough Draft N. & E.* no. 1008.

The Indian Snake-bird or Darter seems to breed generally throughout India, the season varying in different provinces according to the monsoon.

In Ceylon and the country south of Madras, where they get the north-eastern monsoon, they lay in January or February, while in Upper India, where we get the south-western monsoon, the majority breed in August, though a few lay as early as the end of June, and I have found several nests in July. They build moderate-sized stick-nests on trees, three or four pairs building on the same tree, and not unfrequently twenty pairs in the same clump of trees. Like the Little Cormorant, in whose company they so often nest, they seem to have a decided preference for thorny acacias, like the babool, to build on.

They seem to occupy the same trees year after year, occasionally building a new nest, but as a rule only repairing the old ones.

I have seen many of their breeding-haunts, and in every case but one they were small clumps of babool trees, which at the nesting-season stood well out into the water, in some cases half a mile, although in the dry season merely standing at the edge of some lake, swamp, or pond.

Three or four is, I think, the full complement of eggs. I have on several occasions found four in a nest, but never more.

Colonel Butler writes:—"I found a colony of Snake-birds breeding this year (1876) in a tank about 18 miles from Deesa on the 21st August. The nests were large, composed of dead sticks, and closely packed on two low trees (about 15 feet high) growing

out of the water. I cannot say how many nests there were, but the man who went up the tree brought me about 70 eggs, most of which contained chicks about to hatch, and informed me that there were any number of young birds in the nests as well. A number of Little Cormorants were in company with the Snake-birds, but I do not think that any of the eggs brought to me belong to them. In number the eggs vary from 3 to 4. On the 14th September I discovered a single nest containing four fresh eggs in another tank about a mile from where I took the other nests. Probably it was built by one of the birds previously robbed."

He subsequently added this note :—"Mr. Doig and I found numerous colonies of Snake-birds breeding in dense tamarisk trees, that had become partly submerged by the inundation on a dhund in the E. Narra, Sind, at the end of July 1878. Most of the eggs were then fresh, and many of the birds were still building."

Writing from Pegu Mr. Oates says :—"Breeds on trees and not in reeds. It is very abundant in the Myitkyo swamps, where, on the 6th August, I saw some 200 nests on a few low trees. The nests, with few exceptions, contained eggs, a few contained young birds a few days old."

Colonel Legge, writing from Ceylon, says of this species :—" *Plotus melanogaster* is common on the inland tanks of the north and north-east as well as the south-east of Ceylon. The breeding months in the latter region are February and March, and most likely January and February in the north, as the rains are over earlier there than in the south. Three or four pairs may be found nesting at the same spot. They build a flat nest of sticks on the branches of thorny trees growing round the tanks and freshwater swamps on the south-east coast, and lay from two to three eggs. In shape they resemble somewhat the eggs of *Podiceps*, being of less diameter for their length than those of the Little Cormorant (*G. pygmaeus*). They are of a uniform faint greenish white over a green ground, which latter is perceptible when the egg is scratched. They vary a good deal in dimensions."

The eggs closely resemble (though they are perhaps slightly longer and narrower) those that I have already described under *Phal. fuscicollis*. They are much elongated ovals, more or less pointed towards one end, with a dingy greenish-white chalky exterior coat, which becomes more and more sullied as incubation proceeds, and beneath this the real shell of a somewhat pale greenish-blue tint. The chalky covering, as in other eggs of this family, is easily removed by scraping, and even in nature is generally more or less worn off a larger or smaller portion of the surface.

In length the eggs vary from 1.95 to 2.29, and in breadth from 1.28 to 1.46 ; but the average of sixteen eggs is 2.13 by 1.37.

## Family PELECANIDÆ.

*Pelecanus manillensis*, Gmel. *The Spotted-billed Pelican.*

*Pelecanus philippensis*, Gmel., *Jerd. B. Ind.* ii, p. 858; *Hume, Rough Draft N. & E.* no. 1004.

The majority of the vast numbers of Spotted-billed Pelicans that are found in India appear to go to Burma to breed. Mr. Oates gives the following account of an enormous pelicanry he visited in Pegu:—"The only eggs I had of this species were some extracted from females shot in the Sittang River. Last November, however, it was my good fortune to visit a pelicanry which, for extent, is possibly not surpassed by any hitherto visited.

"On the 8th November, 1877, I found myself at the pretty town of Shwaygheen, the head-quarters of the district of the same name. It is situated on the left bank of the Sittang about halfway between Rangoon and Toungoo. The country to the east of the river is everywhere very hilly, and the Sittang appears to have worked itself as far to the east as it is possible for it to get, for its further progress in that direction is prevented by bold projecting hills of laterite. The country to the west is, however, very different. It consists of an immense plain of indefinite length, and extending to the westward to the foot of the Pegu Hills. Certain small tracts are cultivated, but the greater part of the plain is covered with elephant grass or forest, and intersected by numerous creeks choked up with drift and running nowhere in particular. They all, however, ultimately discharge themselves into the Sittang. Considering that these creeks drain the whole eastern half of the Pegu Hills, and have no fall to speak of after entering the plain, it is not to be wondered at that the whole area under notice should, during four or five months, viz., from July to October or November, be nothing but a most dismal swamp, inundated to the depth of ten feet in many parts. Such country is suited only for fishermen, and we accordingly find them very numerous. Indeed the fisheries in this plain yield a very large revenue and give employment to large bodies of men. It is not, however, my intention now to describe these fisheries nor the many ingenious methods employed to catch the fish in shoals with the minimum of labour. I merely wish to give some idea of the country in which Pelicans find a suitable home.

"Leaving Shwaygheen with my friend, Mr. Hough, the Deputy Commissioner, we dropped down the Sittang for about ten miles till we reached the mouth of the Hsa-zay Creek on the right bank. We proceeded up this stream till evening, when we landed at a fishery to dine. We, however, found the smell so bad that we pushed out

into the stream to sleep. Next morning we reached Kadat, a small village where we expected to find the Pelicans. A well-built Burmese house afforded us comfortable quarters.

"The whole stream from the Sittang to Kadat runs through beautiful forest with spare undergrowth, and in many places the stream narrowed so much that we had carefully to pick a way for the boat between the trees. Immense flocks of Pelicans and Adjutants were flying in circles over our heads the whole day. Monkeys were very common, and I saw more specimens of *Polioaëtus ichthyaëtus* during this trip than I have during the whole of my residence in Burma.

"We arrived too late in the day to do anything, but in the afternoon, strolling out, we saw a good many Adjutants' nests, but it was not easy to climb the trees.

"On the morning of the 11th I started early with several Burmans into the forest. The floods had gone down, but the ground was very muddy, and in many places, for long distances, the water came up to my knees. Every quarter of a mile there was a depression or nullah to be crossed, and I soon gave up any idea I might have had of keeping myself dry. Walking was very laborious, for though there was no undergrowth of jungle to speak of, yet the roots of trees embedded in mud and water caused me frequently to trip up.

"The whole forest consisted of very large trees, but a portion, about one in twenty, was made up of wood-oil trees, gigantic fellows, 150 feet high and more, and with a smooth branchless trunk of 80 to 100 feet. These are the trees selected by the Pelicans.

"I was out that day till 3 P.M., continually moving, and must have walked at least twenty miles in various directions, but never from first to last was I out of sight of either a Pelican's or Adjutant's nest. From what I saw, and from what the Burmans told me, I compute the breeding-place of these birds to extend over an area about twenty miles long and five broad.

"I shall describe the Adjutants' nests presently, but with regard to the Pelicans' I noticed that no tree contained less than three nests, and seldom more than fifteen. Some birds select the upper branches, placing their nest in a fork, but others, the majority, placed their nests on the nearly horizontal branches of the tree not far from the trunk. In all cases, the nests on one branch touch each other, and when these nests were on a horizontal branch they looked like an enormous string of beads.

"Judging from the size of the bird I should say the nest is about two feet diameter, and, when in a fork, to be about eighteen inches deep. Others on flat branches are shallower. They are composed entirely of twigs and small branches, and I could detect no lining in those nests which were thrown down to me.

"The eggs are invariably three in number, and on the 11th November all I took were either fresh or only slightly incubated. The female bird sits very closely, and frequently I found that the

bird would not fly off her eggs till I fired a gun. It was a most ludicrous sight to see the sitting birds stretch neck and head out of the nest to have a look at us, as often happened.

"The only trees which the Burmans can climb on the spur of the moment are those which their arms can encircle. To be able to climb *any* tree it is necessary to make bamboo spikes the day before. These are driven into the trunk as the man mounts, and the operation, even for the tallest tree, does not take very long.

"Notwithstanding the millions of birds which breed in this forest, a most wonderful silence prevails. The Pelican seems to be perfectly mute, and the Adjutants only bellow at intervals. The only sound which is constantly heard, and after a time even this sound passes unnoticed, is a sort of *Æolian* harp caused by the movement of the wings of innumerable birds high in air.

"The eggs of this Pelican are pure white at first. As incubation proceeds they change to a brown, and before hatching become in some cases almost black. In texture they are very chalky, and when the outer coat of chalk is scratched or removed, the inner shell is smooth and white. The inner lining of the egg is white, and consequently the eggs of the Pelican can never be mistaken for those of either of the Adjutants, in which the lining is dark green. In shape the eggs are rather long and narrow, equally pointed at both ends. The largest egg I have measures 3.3 in length and 2.08 in breadth, and the smallest 2.65 by 2.05. Looking at a large number, they appear more uniform in size than most eggs of large birds."

Colonel Legge, writing from Ceylon on the breeding of this Pelican, remarks:—"It breeds in February and March, forming colonies in conjunction with other large Waders round lonely tanks in unfrequented parts of the island. Layard mentions a large breeding-place at one immense tank in the Northern Province called Padawia, but I believe this is now dried up.

"I found this species breeding at Uduwila Tank, near Tissa Maha Rama, in the south-east. The nests were large structures, made of good-sized sticks and lined with small twigs; they were placed on the topmost branches of a description of thorny tree growing in the water. The diameter of the fabric was about 2 feet 6 inches, large enough to contain two or three young, at an age when they exceeded a goose in size, with the mother standing up by them; in the same trees were nests of *Tantalus leucocephalus* and *Falcinellus igneus*, the eggs of which I did not procure as the young were already fledged. The number of eggs in the Pelicans' nests was three; long ovals in shape, and of a smooth chalky texture, dirty white in colour. They were terribly soiled, as Pelicans' eggs always are. The two in my possession measure 3.0 and 3.09 respectively in length, and 2.19 and 2.15 in breadth."\*

\* I am under the impression that I sent Mr. Hume a very large number of Pelicans' eggs, but I regret that I cannot find any description of them amongst his papers.—ED.

## Order ANSERES\*.

## Family ANATIDÆ.

## Subfamily ANSERINÆ.

*Anser cinereus*, Meyer. *The Grey Lag Goose.*

*Anser cinereus*, Meyer, *Jerd. B. Ind.* ii, p. 779; *Hume, Rough Draft N. & E.* no. 945.

As far as I know, this species does not in its wild state lay anywhere within our limits. I saw thousands of the Indian Bar-headed Goose, young and old, at various lakes in Thibet, but I cannot remember seeing any Grey Goose.

The only Indian eggs of this species that I have seen were laid in captivity, early in May 1869, by the female of a pair of pinioned wild birds in the possession of Ruttun Singh, of Jugger-nathpoor, Zillah Etawah. The previous year the same bird had laid and hatched a single egg, and had succeeded in rearing the young one until it was destroyed by a snake when about three months old.

The two eggs laid in 1869 are moderately long ovals, the broadest portion in the centre, and the two ends sloping away thence pretty equally. The shell is glossless, and of a compact, but not a very fine texture. The eggs are spotless white, with a faint creamy or ivory tinge, and when held up against the light seem pale pinkish yellow. They measured 3·4 and 3·55 by 2·25 and 2·45.

*Anser indicus* (Lath.) *The Barred-headed Goose.*

*Anser indicus* (Gm.), *Jerd. B. Ind.* ii, p. 782; *Hume, Rough Draft N. & E.* no. 949.

The Barred-headed Goose breeds within our limits only in some of the Thibetan lakes, like the Tso-mourari, Tso-khar, and others which lie in Ladak, at elevations of 12,000 to 14,000 feet, east and north-east of Spiti.

\* Numerous notes on the Game Birds which would, in the ordinary course, have found their way into this edition, were published by Mr. Hume in the 'Game Birds of India.' I do not propose to republish these notes, as the 'Game Birds' is, or ought to be, in the library of every Indian Ornithologist. I have, however, given a short summary of the additional matter in order to render the account of each species in this edition tolerably complete.—ED.

They lay, I believe, in May, and it is, I fear, almost impossible to get over the Passes early enough to secure *their* eggs. Five and twenty years ago, when unfortunately I cared only for sport, I visited several of these lakes during the latter part of June, and at that time they were crowded with good-sized goslings, many of them large enough to be delicious eating.

**Nettapus coromandelianus (Gmel.). *The Cotton Teal Goose.***

*Nettapus coromandelianus (Gm.).*, *Jerd. B. Ind.* ii, p. 786.

*Nettapus coromandelicus (Linn.).*, *Hume, Rough Draft N. & E.* no. 951.

The Cotton Teal Goose, or, as many people call it, the Goslet, seems to breed throughout the Empire, not excepting the Andamans, but not, so far as I know, ascending the hills to any elevation.

I have only found the eggs in July and August, and towards the end of the latter month the young are to be seen about everywhere. I have seen many nests, all in mango-trees, in or at the edge of swamps or ponds, in hollows of large decayed branches, and with very little lining, but it would appear from the remarks of others quoted below that these are by no means the only situations they affect for nesting. I have never found more than twelve eggs, and from eight to ten appear to me to be the usual full complement.

Mr. F. R. Blewitt, writing from Jhansi, says of this species:—  
“It breeds in July and August.

“Just above the village of Burogaon is a large lake from which several eggs of this Goslet were brought. The eggs were collected in the two months on different occasions. It makes a semi-floating nest on the water, among the rushes or lotus-leaves, of weeds, grass, &c., all together, filled up several inches above the water-level.

“The many boatmen of the lake stated that this Goslet breeds there every year, and at the Talbeehut Lake also the boatmen affirmed the same.

“The eggs are of an ivory-white in colour, having an average length of 1·7 and breadth 1·3. I am not certain as to the maximum number of eggs.”

Dr. Jerdon says:—“It breeds generally in holes in old trees, often at some distance from the water, occasionally in ruined houses, temples, old chimneys, and the like, laying eight or ten (sometimes, it is stated, as many as fifteen) small white eggs.”

The late Mr. A. Anderson remarked:—“This species nests in holes of trees and old ruins, and never, according to my experience, in old nests or on the ground.

“I once had an opportunity of watching a pair in the act of selecting their habitation. They invariably flew into the tree together; and while the female used to enter the hole, to recon-

noitre, as it were, the male sat on a bough watching for her exit. No sooner did she make her appearance than they both flew away together, giving utterance to a peculiar cackling sound, which has been pronounced to be like the words 'Fix bayonets.' Their visits used to be repeated at intervals of every fifteen or twenty minutes. The Drake never went into the hole; and I am therefore inclined to believe that he does not lend his aid in the performance of the duties of incubation.

"The greatest number of eggs laid by the Goslet, of which I have a record, is twelve. This nest was taken by Mr. Spry at Budaon in August last. The hole occupied was at no great height; but it was  $3\frac{1}{2}$  feet deep, and only large enough to admit of ingress and egress; the contents had to be removed by means of an iron spoon, something like a soup-ladle with an extra long handle.

"The eggs are obtusely pointed ovals, and certainly large for the size of the bird; they measure 1.7 by 1.3 inch, and in shape and colour are exactly similar to those of the Whistling Teal."

Major C. T. Bingham says:—"I found two nests of this bird near the Phoolepere jheel across the Ganges at Allahabad, both in hollows in decayed branches of old mango-trees, containing respectively 5 and 8 eggs. There was no lining except bits of the wood itself that had broken off. Both nests I found on the 13th July, and the eggs were quite fresh; one being stained in blotches by the decayed wood."

Mr. J. R. Cripps, writing from Furreedpore in Eastern Bengal, says:—"Very common during the rains; and I have on several occasions noticed them during the cold season. Frequents swampy ground. Builds in holes in trees at no great height from the ground. I once found a nest in a hole in a date-tree at 7 feet from the ground and close alongside of a ryot's house. There were twigs and feathers from their own breasts made into a nest; one fresh egg. Some native boys killed the female, and I never again found any more breeding in that hole; they even lay their eggs in the factory-chimney holes. When blowing the above-mentioned egg, I noticed the drops appear phosphorescent as they fell on a pucca floor; the floor was perfectly clean, so cannot make out the reason for this appearance."

In Ceylon this Goslet is said to breed in the early part of the year.

Mr. Oates records the accompanying note from Pegu:—"Nest with ten eggs on the 15th September, in the hole of a mango-tree about 30 feet from the ground."

The eggs are oval, scarcely more pointed at one end than the other. They are miniatures of those of the next species, of a delicate ivory-white colour, very smooth to the touch, but scarcely so glossy as those of the Comb Duck, and as a rule much less liable to become soiled during incubation than those of this latter species.

In length the eggs vary from 1.54 to 1.75, and in breadth from 1.17 to 1.38; but the average of twenty-six is 1.7 by 1.29.

## Subfamily ANATINÆ.

**Sarcidiornis melanotus** (Penn.). *The Comb Duck.*

*Sarkidiornis melanotus* (Penn.), *Jerd. B. Ind.* ii, p. 785; *Hume, Rough Draft N. & E.* no. 950.

The Comb Duck or Nukhtah appears to be partly migratory, for you find it breeding in places where it is never seen in other seasons.

It lays in the North-West Provinces, where alone I have taken its nest, in July, August, and occasionally the first half of September, but in Ceylon it appears to breed in February and March.

According to my experience, it generally nests in some mangrove bordering a jheel or broad, placing its nest, which is composed of sticks, a few dead leaves, grass, and feathers, at no great height from the ground, either in some large hole in the trunk or in the depression between three or four great arms, where the main stem (as it so often does in mango-trees) divides at a height of from six to ten feet.

I have found numerous nests thus situated. Once, and once only, I found a nest in a regular swamp at one end of a jheel in amongst a thick growth of sedge and rush, and in this case no sticks had been used, but the whole nest, which was a foot in diameter and 5 or 6 inches in depth, was composed of reeds and rushes, lined with a little dry grass and a few feathers; this nest had a good deep cavity, I daresay fully 4 inches in depth, while those found in trees had central depressions barely half this depth. Twelve is the largest number of eggs that I have found, and I believe seven or eight to be the usual complement; but on this head see the following interesting remarks by the late Mr. A. Anderson. He says:—

“The Nukta or Comb Duck (*Sarkidiornis melanotus*), the Whistling Teal (*Dendrocygna arcuata*), with the Cotton Teal (*Nettapus coromandelianus*) are non-migrant, and breed throughout the plains of India during the ‘rains,’ viz., from July to September, according to locality.

“These Ducks, according to my experience, nest almost exclusively on trees; and they are, so far as nidification is concerned, essentially perching Ducks. They begin to pair early in June, and may be seen flying about in search of a suitable tree almost simultaneously with the first fall of rain, which generally occurs in the North-West Provinces on or about the 18th of that month.

“*Sarkidiornis melanotus*.—This curious and handsomely-coloured Duck deposits its eggs in holes of old deciduous trees, and never, I should say, in grass by the sides of tanks, &c., as stated by Jerdon. The male bird (as in fact do all the others)

assists the female in the selection of a site. I have frequently watched both birds flying into trees together, the male uttering a harsh grating noise, while his mate is left behind on inspection duty.

“Although the Nuktas nest by preference in trees, I have known their doing so in holes of old ruined forts ; as a general rule, they select localities in close proximity to water.

“I have no actual proof of their appropriating old nests, as is frequently done by the Whistling Teal ; but it is worth mentioning that a nest of *Haliaëtus leucoryphus*, which I had examined last winter for the eggs of *Ascalaphia bengalensis* and which was at the time tenanted by this Owl, actually contained seven or eight rotten eggs which are, in my opinion, referable to this Duck.

“The number of eggs seems to vary considerably ; fifteen and twenty have been brought to me from one nest, the advanced state of incubation clearly indicating that in all cases the full complement had been laid. I was present, however, at the capture of a female Nukta on her nest, which yielded the extraordinary number of forty eggs! Of course it is just possible, though highly improbable, that this may have been the joint produce of two birds ; but the emaciated condition of the one captured, coupled with the fact that one egg was an abnormally small one, and evidently her last effort, do not favour such a supposition.

“The tree selected was an ancient banyan (*Ficus indica*), which overlooked a large sheet of water several miles in circumference ; the nest-hole was at an elevation of some 20 feet, 3 feet deep, and 2 in circumference.

“The eggs (incubation had barely commenced) were laid several tiers deep, and those at the bottom were a little soiled from resting on the damp wood. It is highly probable that a large proportion of these eggs are never hatched, and that they all become discoloured as the process of incubation progresses.

“The thirty-nine full-sized eggs average  $2\frac{1}{2}$  by  $1\frac{3}{4}$  inches ; they are long obtusely-pointed ovals ; and in feel, polish, and texture they resemble a white billiard ball.

“The boss or fleshy protuberance of the Drake gets greatly enlarged during the breeding-season, frequently measuring  $2\cdot2 \times 2\cdot4$  inches at the base.”

Colonel G. F. L. Marshall says :—“I took one egg on the 20th July from a mulberry-tree. I found an egg of this species in a nest of *Dissura episcopus*, with three eggs of the latter bird : this is, I believe, an unusual occurrence.”

Major McInroy told me that this Duck bred to his knowledge in the Bagriodkere tank in the Chittaldoog district and in some other districts in Mysore ; and Mr. J. Davidson writes :—“In the Pánchez Méhals it was very fairly common, a pair inhabiting nearly every one of the small tanks which are scattered about everywhere. They breed in the latter part of the rains ; the only nest I took contained thirteen eggs and was in the hollow top of a dead mango-tree, but I saw the young in very many places.”

Major Wardlaw Ramsay says that it breeds in Tonghoo in July and August.

The eggs are regular ovals, only slightly more pointed at one end than the other. The texture of the shell is wonderfully close and compact, and, when fresh, the eggs, both in colour and appearance, seem made of polished ivory. As incubation proceeds a good deal of the gloss disappears, and the delicate ivory-white becomes stained and sullied, but even to the last they are one of the smoothest eggs to the touch that we have.

The eggs vary in length from 2·22 to 2·58, and in breadth from 1·65 to 1·78; but the average of the forty-five eggs is 2·41 by 1·72.

**Dendrocygna javanica (Horsf.). The Lesser Whistling Teal.**

*Dendrocygna awsuree (Sykes), Jerd. B. Ind. ii, p. 789.*

*Dendrocygna arcuata (Cuv.), Hume, Rough Draft N. & E. no. 952.*

The Lesser Whistling Teal appears to breed in most parts of the Empire, is very common at the Nicobars, and has recently been obtained at the Andamans also.

I have found its eggs in two situations—in hollows in trees or between the larger branches of these, either unlined or slightly lined with grass and feathers, or in old Crows' and Kites' nests, which it lines in a similar fashion. In all cases the trees in or on which I have found it nesting have been in the immediate proximity of water. This, however, as will be seen further on, is not at all the rule elsewhere. With us it lays in July and August, and a few eggs may be found even during the first half of September; but the majority have, I think, hatched off by the first of that month. Twelve is the maximum number of eggs that I have seen in any nest, and ten or eleven are, I think, the usual complement.

Dr. Jerdon tells us (whether as the result of his own observation or on the strength of the statements of others it is impossible to say) that the Whistling Teal "generally, perhaps, breeds in the drier patches of grass on the ground, often at a considerable distance from water, carefully concealing its nest by intertwining some blades of grass over it. Occasionally, however, it builds its nest in hollows of trees, and not unfrequently in nests made of sticks, and that have, in some cases at all events, been used by Cormorants or Small Herons.

Colonel G. F. L. Marshall remarks that "this species builds in trees a nest of sticks, and lays about seven to ten eggs, of a white, fawn, or olive-brown colour. A nest found on the 25th of July near Bolundshar contained only one egg, on which both the parent birds were sitting. It was a tolerably compact structure of twigs in a keekur-tree at the edge of a jheel, about eight feet from the road; it was at the side of a metalled road near a large town. I shot the male, but missed the female with the left barrel. When I

returned next day there was a pair of birds on the nest again, so that the female had apparently provided herself with a fresh mate in that short interval. In another case the nest was swarming with ants and maggots."

The late Mr. A. Anderson remarks:—"Jerdon could never have found a full clutch of the eggs of the Whistling Teal, or he would not have limited the number to 'six or eight' ('Birds of India,' vol. iii. p. 790). Ordinarily this Duck lays fully a dozen eggs; but I am indebted to my friend Mr. Fynes-Clinton for two clutches of twelve and fourteen respectively, which he took from the same nest; whether these were laid by one or two birds must of course remain an open question.

"On the 29th June, 1872, Mr. Clinton flushed a bird from the top of a low date-palm (*Phoenix dactylifera*) and found the first-mentioned lot (twelve); on the 13th July he happened to visit the same locality, and to his surprise found the second clutch in exactly the same situation; the Duck was on her eggs. Now the dates are so coincident that, supposing these twenty-six eggs to be the produce of two birds, the second one must have laid her first egg the very day after the removal of the first batch.

"As to situation, the choice may be mentioned in the following order:—(1st) depression at the fork of the lower branches of large-limbed trees; (2nd) old nests, particularly those belonging to Crows, Herons, &c.; and (3rd) thorny scrub or grass on the edge of swamps.

"The eggs measure 1·9 by 1·5 inch, and when fresh are of a milky-white colour; the inside membrane is a delicate salmon-pink tint."

In Ceylon this Teal breeds from June until August.

Major Bingham found a nest of this Teal near Delhi in a hollow of a decayed branch of a tree on the 9th August. Colonel Butler tells us that he found a nest with ten slightly incubated eggs on the 24th August at Deesa. The nest was placed in a tussock of grass. Mr. Doig took ten fresh eggs from a nest in the Eastern Narra, Sind, on the 22nd June. This and other nests subsequently taken were placed on creeper-covered tamarisk bushes at heights from 3 to 8 feet above the water. Mr. Brooks took a nest of this species out of a broken tree-stump about 4 feet high. Mr. J. Davidson informs us that in the Pánch Méhals he found several nests in tufts of grass in September and October. At Faridpur, Dacca, and Sylhet this Teal, according to Mr. Cripps, breeds in July and August, the nest being placed both in trees and on the ground. In Pegu Mr. Oates took nests from the 6th July to the 29th August. The nests were built on thick matted cane-breaks in paddy-fields. Major Wardlaw Ramsay records August and September as the months in which he found nests in Burma.

The eggs of this species are usually very broad ovals, often slightly compressed towards one end. In texture they differ much from those of the Comb Duck and Teal Goose already described. They lack the exquisite smoothness and satiny feel of these latter,

and instead of the delicate ivory-white they are, when fresh, nearly pure white, becoming no doubt yellowish or brownish and sullied as incubation proceeds. Here and there one may exhibit a slight gloss, but as a rule this is almost entirely wanting.

In length the eggs vary from 1·72 to 2·0, and in breadth from 1·4 to 1·6; but the average of forty-four is 1·86 by 1·49.

**Dendrocygna fulva** (Gmel.). *The Larger Whistling Teal.*

*Dendrocygna major*, *Jerd., Jerd. B. Ind.* ii, p. 790; *Hume, Rough Draft N. & E.* no. 953.

It is from Saugor in the Central Provinces that I have received the only eggs and almost the only specimens I possess of this species.

One nest was found on the 15th August; it was a large hollow in an old tree overhanging a large piece of water, rather liberally lined with a few twigs, a good deal of grass, and some feathers. It contained seven eggs, a good deal incubated.

The eggs, except for size and a somewhat superior smoothness, are precisely like those of the Lesser Whistling Teal--very broad regular ovals, moderately smooth to the touch, but with no perceptible gloss, and of a dull yellowish-white colour. Probably when first laid the eggs were pure white.

In length they vary from 2·12 to 2·25, and in breadth from 1·65 to 1·75.

**Tadorna casarca** (Linn.). *The Brahminy Duck.*

*Casarca rutila* (Pall.), *Jerd. B. Ind.* ii, p. 791; *Hume, Rough Draft N. & E.* no. 954.

The Ruddy Sheldrake, or Brahminy Duck as in India it is universally called, breeds throughout the high central portion of the interior of the Himalayas. It nests always, the people say, in holes in cliffs overhanging, or at any rate in close proximity to, streams, lakes, or pools, at an elevation of not less than 12,000 and often as high as 16,000 feet.

I have seen the old birds with crowds of tiny ducklings on several of the Thibetan lakes towards the end of June; but this was in old days when I cared for none of these things, and I never climbed up to examine a nest-hole, of which many have been pointed out to me in the cliffs, conspicuous by the droppings of the birds.

In the account of the first Yarkand Mission we say that this species was first noticed at the hot springs above Gokra, at an elevation of 16,000 feet. There they were seen on small lakes that are dotted about on the Salt Plain and all along the Karakash River. The young were at that time (July) scarcely able to fly; when approached, the mother made them all dive by swimming and

flapping on to each of them as soon as it showed itself above water. The mother also pretended to be wounded, and lay on the water every now and then with wings spread out as if unable to fly. All along the Karakash Valley and also on the high tableland, wherever there was water overhung by cliffs, there numbers of Brahminy Ducks with broods of young ones were seen, and holes in these cliffs plastered over with droppings were pointed out by the Kerghiz as the places in which they had bred.

I do not know that any European has as yet taken their eggs within our limits. They have mostly all left the plains by the 15th April, and I should judge that they laid early in May, before, in fact, it is possible to cross the Passes to the places they breed in.

Long ago Dr. Adams recorded that he had "found the *Anas rutila* breeding among the rocks surrounding the fresh- and salt-water lakes of Ladak, and that *Bernicla indica* and *Anser albifrons* were seen in great numbers in June and July on the Chimmanraree (Tso-mourari) Lake. These lakes are about as far north as it is safe at present for Europeans to travel."

Mr. F. R. Mallet remarks, *in epistola* :—" As to the Brahminy Ducks (*Casarca rutila*), I first observed them in Thibet, north of the Niti Pass, at an elevation of about 14,000 feet, on a shallow stagnant pond. There were the old pair and eight young ones unable to fly. I bagged all the latter; but the old parties did not see the fun of it at all, and kept out of range. This year I first saw a solitary one in Spiti on a small shallow pond about 13,000 feet.

" In neither of these cases was there much vegetation; in fact, almost none. Afterwards we saw perhaps two dozen old and young in the streams flowing into the Indus in Ladak (part of the Cashmere territory). These streams are rapid, but smooth, and bordered by coarse grassy plains, from a mile to two miles wide, marshy near the middle. They contain plenty of small fish, and the Ducks I shot near the Niti had a very fishy taste.

" These streams are about 14,000 to 15,000 feet above the sea, and there were lots of Geese on one of them.

" I never saw 'Brahminies' on the rough streams and torrents, except *north* of the first high ranges of the Himalayas, at elevations of 13,000 to 15,000 feet.

" They are not found in the outer high ranges of the Himalayas themselves, but in Thibet, Ladak, &c."

***Anas leucoptera* (Blyth). *The White-winged Wood-Duck.***

*Casarca leucoptera* (*Bl.*), *Jerd. B. Ind.* ii, p. 793.

*Casarca scutulata* (*S. Müll.*), *Hume, Cat.* no. 955.

Nothing definite is known of the nidification of the White-winged Wood-Duck; but Colonel Godwin-Austen remarks :—" I got this bird at Dimapur on the Dunsiri River; it appears to prefer sluggish streams like this flowing through forest, for I once

flushed this bird in such a haunt in the interior of the Garo Hills. I am informed by Mr. James, of the Police at Samaguting, that it breeds on the Dunsiri, and that he had shot the young birds."

**Anas boscas**, Linn. *The Wild Duck.*

*Anas boschas* (Linn.), *Jerd. B. Ind.* ii, p. 798; *Hume, Rough Draft N. & E.* no. 958.

The Wild Duck, or Mallard, only breeds within our limits, so far as we yet know, in the marshes and lakes of Cashmere. There it nests abundantly, building its coarse grass nest, more or less lined with down or feathers, in clumps of rushes, beneath the overhanging grass at the edges of watercourses or even in rice-fields.

It lays in May and the first week in June. Twelve is the largest number of eggs seen in any nest by my collector (a native), who examined hundreds of them. There is quite a trade in the eggs of this species and *Fuligula nyroca* at Sirinugger, and my man went out daily almost for a month in one of the egging boats. The boatmen told him that they *had* found as many as sixteen eggs in one Mallard's nest!

Mr. Brooks says, *in epistola* :—"The Mallard's nest I took was amongst rushes in a rather dry spot of one of the Cashmere lakes; it was built of straw and dry rushes, and lined with the bird's own down."

Mr. W. Theobald makes the following remarks on the nidification of this species in the Valley of Cashmere :—"Lays in the first week of May. Eggs, long ovato-pyriform. Size 2·27 by 1·55. Colour, dirty white with a fringe of yellowish green near sepia."

The late Major Cock wrote to me that this species "breeds in large numbers on the Anchar Dall and other lakes in Cashmere during the months of May and June; boat-loads of their eggs are brought to the Sirinugger bazaars for sale, together with the eggs of the Coot and White-eyed Duck. The Mallard breeds near the water in among reeds or high grass, lays six, eight, or more eggs, of a peculiar oil-green colour. The nest is formed of dried grass or flag with a little down from the bird's breast, and placed under an overhanging tuft of grass or rush. The female sits close and allows you to come very near before she leaves her eggs." I may add that she will allow herself to be captured by hand on the nest, if the eggs are near hatching."

The eggs of the Mallard vary a good deal in size and colour. In shape they differ little, and are moderately broad regular ovals, not unfrequently slightly compressed towards one end. In texture the shell is very fine and smooth, and has a faint gloss. The egg is quite devoid of markings, and when freshly laid has a dull pale greenish tint; but as incubation proceeds it changes to a very pale drab or dingy stone-colour, and every intermediate shade is observable. In size they differ little from those of the Spotted-billed Duck,

but the latter are always whiter and never exhibit the green tinge so conspicuous in the freshly-laid egg of the Common Wild Duck.

The eggs vary in length from 2·1 to 2·38, and in breadth from 1·5 to 1·72; but the average of thirty eggs is 2·23 by 1·6.

*Anas pœcilorhyncha* (Forst.). *The Spotted-billed Duck.*

*Anas pœcilorhyncha*, *Penn.*, *Jerd. B. Ind.* ii, p. 799; *Hume, Rough Draft N. & E.* no. 959.

The Spotted-billed or Grey Duck breeds, I believe, in suitable localities all over the plains of India.

The nest appears to be generally placed upon the ground, and rarely in the fork of some flat branch just above the surface of the ground or water, in low dense cover of grass, rush, and the like, to be of the usual duck type, and to contain from six to twelve eggs.

A nest which I found on the 1st August at Rahun was placed on a drooping branch of a tree, which hung down from a canal bank into a thick clump of rushes growing in a jheel that, near the bridge, fringes the canal. The nest was about nine inches above the surface of the water, was entirely concealed in the high rushes, and was firmly based on a horizontal trifurcation of the bough. It was composed of dry rush, and had a good deep hollow in which down, feathers, and fine grass were intermingled. The nest was at least a foot in diameter, perhaps more, and I suppose 2 inches thick in the centre and four inches at the sides. It contained three fresh eggs.

A second nest I found on the 29th August in a large jheel, half swamp, half lake, in front of Moonj (also in the Etawah District), on the ground in a low thick bed of sedge on an island about 2 yards square, to reach which a man had to swim. I did not see the nest (though I saw the bird flushed and the eggs taken), but it was described to me much as I have described the nest that I myself examined. The nest contained six fresh eggs.

Colonel G. F. L. Marshall writes:—"I found a nest in the Muttra District on the 31st August, 1871. It was a well-made, cup-shaped nest of grass, fresh plucked, about 9 inches across, 3 inches deep, and the sides fully 2 inches thick; it was sparingly lined with down and feathers from the breast of the parent bird, and contained seven brownish-white eggs. It was placed on the ground in a slight hollow among thick grass, about 18 inches high under the trees on the outer side of the canal bank, and about a yard from the edge of a small excavation pit, full of water. The bird was on the nest, and when roused flew with difficulty."

Mr. Doig found nests of this Duck in Sind on the 28th of April and 1st of May. They were in long grass on the ground, on small islands. Colonel Butler states that he found several nests in October, between Deesa and Ahmedabad, on the ground in long grass. In Mysore, according to Major McInroy, flappers,

quite unable to fly, are to be seen in January and February, so that the eggs were probably hatched in December.

The eggs are of the usual broad oval type, in texture compact and smooth, but without the polish and gloss which characterize the somewhat similar eggs of the Comb Duck. In colour too they are when fresh white or greyish white, and never, so far as I have yet seen, exhibit that creamy or ivory tinge already noticed in the case of the Comb Duck and Cotton Teal.

As incubation proceeds, they become yellowish and sullied, and hard-set eggs are occasionally a very dingy and pale earth-brown.

The eggs vary in length from 2·08 to 2·3, and in breadth from 1·65 to 1·8; but the average of fifteen eggs is 2·15 by 1·70.

**Rhodonessa caryophyllacea** (Lath.). *The Pink-headed Duck.*

*Anas caryophyllacea*, Lath., *Jerd. B. Ind.* ii, p. 800; *Hume, Rough Draft N. & E.* no. 960.

Of the Pink-headed Duck Dr. Jerdon says:—"It breeds towards the end of the hot season, and its eggs are said to be laid amongst thick grass not far from the water."

Mr. F. A. Shillingford sent me the following note:—"On the 3rd July, Mr. T. Hill, of Jouneah Factory, succeeded in finding a nest of the Pink-headed Duck near the Dabee poor Factory.

"The nest contained nine much incubated eggs, of which I send you five. These, as you will observe, are of precisely the same type as the one I formerly sent you.

"The nest was well hidden in tall grass (*Andropogon muricatum*), and both male and female were started from the vicinity of the nest, which was about 400 yards from a nullah containing water. The nest was well formed, made of dry grass, interspersed with a few feathers, the interior portion being circular and about 9 inches in diameter, and 4 to 5 inches deep."

The eggs are quite unlike those of any other Duck with which I am acquainted. In shape they are very nearly spherical; indeed one is almost a perfect sphere.

The shell is very close and compact, but not particularly smooth or satiny to the touch, and is entirely devoid of gloss.

In colour it is a dull, nearly pure white, with here and there traces of an extremely faint yellowish mottling, probably the result of dirt. Even held up against the light, the shell is white, with a scarcely perceptible ivory tinge.

The five eggs sent me by Mr. Shillingford measure as follows:—1·82 by 1·7, 1·78 by 1·68, 1·8 by 1·62, 1·71 by 1·69, 1·81 by 1·61.

**Querquedula gibberifrons** (S. Müll.). *The Oceanic Teal.*

*Mareca gibberifrons* (S. Müll.), *Hume, Rough Draft N. & E.* no. 963 bis.

*Querquedula gibberifrons* (S. Müll.), *Hume, Cat.* no. 936 ter.

The Oceanic Teal breeds (and indeed occurs) within our limits only in the Andamans. I have only one record of its nidification and a single egg, both of which I owe to Captain Wimberley.

The nest was found in August; it was composed of grass, and was placed in a paddy-field near Port Mouat, the only locality with which we are yet acquainted in the group where this species is always to be met with.

The egg is typical, a very perfect broad oval in shape, with a very close-grained smooth shell, devoid of gloss, and of a uniform delicate cream-colour.

It measures 1·93 by 1·43.

**Querquedula circia (Linn.). *The Garganey Teal.***

*Querquedula circia (Linn.),* *Jerd. B. Ind.* ii, p. 807; *Hume, Rough Draft N. & E.* no. 965.

The Garganey or Summer Teal is to most parts of India only an autumn and cold-weather visitant. It returns very early. I have shot it repeatedly during the third week of August, but it certainly leaves every part of Upper India during the hot season.

There is some reason, however, to think that it may breed in Tenasserim. Writing thence, the late Colonel Tickell says:—“Another singular occurrence is the breeding of the Garganey in this part of the country (Moulmein). I have a young one now alive, which was brought to me just fledged from a pond or small lake about twelve miles off.”

Mr. Blyth added, with reference to this statement, that “the Garganey breeds sparingly no doubt in India, as well as in Burmah and Tenasserim.” I have failed to obtain any confirmation of this surmise; indeed, all the evidence from all parts of the country that I have been able to accumulate points the other way, and I may add that no one since Colonel Tickell has apparently been able to learn anything of its breeding in Tenasserim. I cannot find out that anyone has ever seen it during the summer at the Thibetan lakes; but I have numerous specimens shot in the interior of the Himalayas during the spring, and again during the latter half of August, thus apparently showing that these birds for the most part go north beyond the hills to breed.

Colonel Irby, however, tells us that when in Oudh he “caught some young, half-fledged, in the month of September.”\*

\* *CHAULELASMUS ANGUSTIROSTRIS* (Ménétr.). *The Marbled Duck.*

*Chaulelasmus angustirostris* (Ménétr.), *Hume, Cat.* no. 961 bis.

Colonel Butler received some eggs from the Mekran Coast which he identifies as those of the Marbled Duck. He says:—

“I received some small Duck's eggs from the Mekran Coast, which are in my opinion those of the Marbled Duck. The nest was on the ground under a

*Fuligula nyroca* (Güldenst.). *The White-eyed Pochard.*

*Aythya nyroca* (Güld.), *Jerd. B. Ind.* ii, p. 813; *Hume, Rough Draft N. & E.* no. 969.

The White-eyed Pochard or Ferruginous Duck breeds, I believe, in some localities in the plains of India; and in Sind, where it swarms during the cold weather, I was informed that it remains during the whole year. I have never, however, succeeded in finding a nest, or obtaining any reliable information as to one being found in the plains.

In the lakes in Cashmere they breed most abundantly, so abundantly that boat-loads of their eggs are brought into the Sirinugger market during the season.

They lay in June, and, according to my native collector, who examined a vast number of their nests, build a moderate-sized nest of dry rush and sedge in amongst rushes, reeds, and water-weeds, sometimes on the ground and sometimes more or less floating and supported on masses of water-plants. The interior of the nest is composed of rather finer materials, and the eggs are generally more or less intermixed with feathers and down.

Ten was the largest number of eggs found in any nest.

The eggs of this species are at once distinguished from those of any other Duck laying within our limits with which I am acquainted, by their well-marked, though delicate, *café-au-lait* tint, which, however, has often a faint greenish tinge. In shape they are commonly very regular and perfect ovals, moderately broad as a rule, but occasionally considerably elongated and slightly compressed towards the large end. The shell is very smooth and fine, but it has very little gloss.

In length the eggs vary from 1.9 to 2.2 in length, and from 1.4 to 1.54 in breadth; but the average of a large series is 2.1 by 1.49.

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solitary babool bush, growing on an extensive tract of salt marsh, some seven or eight miles N. of Ormarra, called Moorputty, and consisted, according to the account of the native who found it, of a collection of fine twigs formed into a solid pad with a few pieces of down as a lining, and measuring eight or nine inches in diameter.

"The eggs, eight in number, and of a delicate cream-colour, were taken on the 19th June, 1878. I have carefully compared them with eggs of the Marbled Duck, and find that they agree exactly, both in size, colour, and texture. They are certainly not Garganey's eggs, being too large, and I know of no other Duck inhabiting that district they could possibly belong to except the present species.

"They vary in size from 1.8 to 1.9 in length, and from 1.35 to 1.43 in breadth."

## Order GAVIÆ.

## Family LARIDÆ.

## Subfamily LARINÆ.

**Larus brunneicephalus**, Jerd. *The Brown-headed Gull.*

*Xema brunneicephala* (Jerd.), Jerd. *B. Ind.* ii, p. 832.

*Larus brunneicephalus*, Jerd., *Hume, Rough Draft N. & E.* no. 980.

The nest of the Brown-headed Gull has never yet, I believe, been taken, but the first Yarkand Mission found the birds very abundant in July, at an elevation of about 15,000 feet, in a small stream running down from Chagra into the Pangong Lake, and there is good reason to believe (all the birds seen were in full breeding-plumage) that they had nests in the immediate neighbourhood. The lake itself is very salt and very bare, and doubtless it was somewhere just at the mouth of the Chagra stream, which is fresh, that these Gulls were breeding.

**Larus hemprichi**, Bonap. *Hemprich's Gull.*

*Larus hemprichi*, Bonap., *Hume, Cat.* no. 981 ter.

Colonel Butler obtained eggs of Hemprich's Gull from the Island of Astolah. He writes:—"On the 6th August, 1877, I sent a boat from Pusnee to the island of Astolah, on the Mekran coast, and secured about 150 eggs of this species. The eggs were fresh, and laid in nests built in the low salt bushes (*Salsola* sp.), which are scattered about the tableland on the top of the island. The only information I could gather from the boatmen is as follows:—The nests, which are about the size of crows', are loose and ragged in construction, composed of the twigs of the low salt bushes in which they were built, and always carefully concealed from view.

"I heard subsequently from other natives that the eggs were sometimes laid on rocks, but always carefully hidden, and consequently difficult to find. As there is no doubt that the eggs I procured were laid in nests concealed in low bushes, I should be inclined to doubt that the birds ever laid, like Terns, on the bare ground.

"The eggs, which according to the report of the boatmen who took them vary in number from one to three, differ a good deal in shape and colour."

The eggs are broad ovals, many of them quite fowl-like in shape, but some a little more pointed towards the small end.

The shell is close and compact, but not very fine-grained, showing when at all closely looked into a multitude of pores, but it has nevertheless a slight gloss.

Typically, the ground is a pale, *slightly* buffy brown stone-colour, but in some it is paler and more creamy, and in a few it is darker, a *café au lait* with not very much of the milk in it. Typically, again, the markings are numerous and moderate-sized, irregular blotches and spots, which are brown of various degrees of intensity, usually where thinly laid on showing a sort of olivaceous tinge, but occasionally in the darker eggs being more of a coffee-brown. Besides these there are the usual secondary markings, fairly conspicuous in some eggs, barely noticeable in others, spots, moderate-sized blotches, and tiny clouds of pale inky purple or lilac grey. In some few of the eggs, almost exclusively those with the darker grounds, the primary markings are few and large, and again, equally exclusively amongst those with the paler creamer grounds, these markings are all very small and more numerous than usual, the secondary markings showing up naturally much more distinctly in these eggs than in the darker ones. As amongst all species of this family amongst a series of some hundreds, one or two quite abnormal almost spotless eggs are met with.

The eggs vary from 2.10 to 2.45 in length, and from 1.45 to 1.72 in breadth.

**Larus gelastes**, Licht. *The Slender-billed Gull.*

*Larus gelastes*, *Licht.*, *Hume, Cat.* no. 981 quat.

Colonel Butler writes of the nidification of this species on the Mekran coast:—"On the 28th and 29th May, 1878, my friend Mr. Nash, Telegraph Dept., went at my request to a swamp called Moorputty, about 8 miles N.N.W. of Ormarra on the Mekran coast, to look for Flamingos' eggs. The place consists of a creek running out of the sea inland, and terminating in flat marshy ground some 9 or 10 miles in extent, with scarcely a particle of vegetation except a few low bushes dotted about in one or two places. After the rains it looks like an immense river, but towards the hot weather as the water dries up, small mud islands from 50 to 100 yards in diameter become visible from day to day as the water goes down, and on these islands he found a few nests of the present species.

"On one island he found two nests only a few yards apart, each containing three eggs, and on another two or three more nests containing from one to three eggs each. All of the eggs were quite fresh and three seemed to be the usual number. The nests consisted of a substantial pad of seaweed about 8 inches in diameter, raised a few inches above the ground, and very solidly constructed. There were only a few pairs of birds breeding, and the nests were a good deal scattered."

The eggs of this species are broad to moderately broad oval, not unfrequently somewhat markedly pointed towards the small end. The shell is fine and moderately compact, but has not the slightest gloss. The ground-colour is as a rule dull white, though in some eggs a slight creamy tinge is apparent; but, taking a series, the white or almost white ground is the most marked feature in the eggs of this species.

The primary markings in these eggs are rather of a burnt-umber than a sepia-brown, in some cases almost black, in others where paler with a reddish rather than an olive tinge; the secondary markings are as usual pale greyish lilac. Taken as a body the eggs are well marked; if the markings are small, then they are numerous and spread well over the egg; if few in number, then they are large and bold, and in such cases very often exhibit a tendency to form a conspicuous zone about the large end.

They vary from 2·1 to 2·27 in length by 1·45 to 1·6 in breadth.

### Subfamily STERNINÆ.

#### *Sterna caspia*, Pall. *The Caspian Tern.*

*Sylochelidon caspius* (*Lath.*), *Jerd. B. Ind.* ii, p. 835.

*Sterna caspia*, *Pall.*, *Hume, Cat.* no. 982.

Mr. H. Parker is the only naturalist who has found this Tern breeding within the limits of the Empire. Writing from Northwest Ceylon, he says:—

“ *June*.—Considerable numbers of these birds, mostly non-breeders I believe, frequent the sand banks near Mannár throughout the year. When examining the banks at Adam’s Bridge, I came upon a colony of six nests of these fine Terns, containing nine eggs. They were shallow hollows scratched in the sand, from five to seven inches wide and one to one and a half inch deep. Two had a partial lining of twigs and a few shells, but the others were without any. The number of eggs was one or two. The nests were on the highest ridge of the bank, all near together, from one foot to about six feet apart, and not more than a few inches above high-water level. The average size of the eggs is 2·43 inches by 1·70. ”

“ The birds at first circled round for a short time, and afterwards joined a large party of other Terns at a small neighbouring bank, from which some of them made frequent sallies, flying over my head a few times and then returning. Their cry was a hoarse croak or a scream. ”

“ Later in the day I found a pair evidently breeding at another bank beyond that at which my expedition ended, but I could not spare time to visit it. They came out boldly to attack my men, and made very determined swoops, often coming within three feet

of my head. They then rose vertically above me for 50 or 60 feet, and after flying back towards the nest returned to renew the assaults. The more timid of the birds, which I presume was the female, occasionally settled on the nest for a short time, while the male was engaged in bullying me; as I told him at the time, it was nothing else; I had not attempted to molest him and the nest was certainly quite half a mile away."

Colonel Butler records the following note regarding the nidification of this Tern in the Persian Gulf:—"On the 3rd April, 1878, at my request and through the kindness of Mr. Huskisson, Telegraph Department, a boat was sent to the island of Warba in the Kore Abdullah, at the head of the Persian Gulf, and a fine series of the eggs of this bird obtained.

"There were two species of Terns breeding on the island at the time, viz. *Sterna anglica* and the present species, the former in one part of the island and the latter in another.

"In both cases the nests were very abundant and built in colonies with a space of about one foot between them. The nests consisted of small mounds of sand scraped up about 4 or 5 inches high, with small sticks and twigs on the top for the eggs to rest upon, and most of them contained *three* eggs more or less incubated. Skins of both species (*S. anglica* and *S. caspia*) were forwarded to me with the eggs for identification, and as there were no other birds at all on the island at that time except a few Herons (*A. cinerea*), which were also breeding, I think there can be no doubt of their identity."

The eggs of this species are, as a rule, comparatively broad ovals, and but few of them show any sort of tendency to being pointed at the small end; here and there in a large series rather more elongated examples occur.

The shell is compact and firm, but by no means fine-grained, and is entirely devoid of gloss.

The ground-colour of the great majority of the eggs is greyish white, with the faintest possible creamy, buffy, or pinky tinge; but in a few eggs it is decidedly brown or buff stone-colour. As usual in the Terns, the markings are of two characters, first the primary ones, of varying shades of brown from almost black to a sort of olivaceous sepia, and the secondary ones, which seem to lie beneath the surface of the shell, and are pale lilac or pale greyish purple. Rarely are the markings at all thickly set in the eggs of this species; indeed, the characteristic of this latter is small markings for the size of the egg and these thinly set. It is difficult in words to convey a correct idea of these differences, but I think that the eggs of this species are distinguishable at a glance from those of any other that we get in India, though some of them undoubtedly run very close to some of those of *L. hemprichi*, which, however, are considerably smaller as a body, and much more distinctly and universally buffy in their tinge. The eggs vary from 2·3 to 2·75 in length and from 1·71 to 1·89 in breadth.

*Sterna bergii*, Licht. *The Large Crested Tern.*

*Thalasseus cristatus* (*Steph.*), *Jerd. B. Ind.* ii, p. 842.

*Sterna bergii*, *Licht.*, *Hume, Rough Draft N. & E.* no. 989.

In regard to the present species, *Sterna bergii*, I note that we saw an enormous flock of it at Pere-Mull-Par, in the Laccadive Islands, a small flock at Cherbaniani reef, and a single specimen near Bingaroo in the Ancuttee tala. At Pere-Mull it very probably breeds, but the only breeding-place of this species within our limits of which I yet know for certain, is the rocky island of Astolah, which lies off the Mekran coast opposite Jask, a short distance beyond the boundary of Sind. On this island this species breeds in vast numbers in the early part of the monsoons. A boat sent to this island for me by Captain Wise on the 1st June, brought back no less than 3000 eggs of this species, and the men said that they had not half robbed the rocks.

Colonel Butler, who visited the breeding-place of this Tern on Astolah Island, writes:—"On the 29th May, 1877, I landed at Astolah, an island on the Mekran coast, which I have previously described, about 24 miles S.W. of Pusnee. On reaching the summit, I found the plateau covered from one end of the island to the other with *Larus hemprichi*, which were evidently collected there for breeding-purposes; but there were no eggs on that date, although what appeared to be nest-holes were scratched in every direction. These, however, may only have been *dusting*-holes such as hens scratch, for I noticed the birds *dusting* their feathers as they sat and grovelled in the holes.

"Several groups of the large Sea-Tern had just commenced to lay, and I succeeded in taking 93 eggs, all perfectly fresh. The birds make no nest, neither do they even scratch a nest-hole. The eggs (at that time only one in each nest, or rather to each pair of birds, for as I have said before there is no nest) are laid on the bare ground in the most open and exposed parts of the island about one foot apart, and when sitting the birds seem packed together as close as possible, without perhaps actually touching each other. There is no difficulty in discovering the eggs, as the birds, often as many as two hundred or more in a group, sit close, with quantities of stragglers, probably the cock birds, flying backwards and forwards a few yards above them, the whole keeping up a tremendous clamouring, and when approached they rise reluctantly off their eggs screaming and chattering loudly. I did not see the first group rise myself, and as there were hundreds of Gulls (*L. hemprichi*) mixed with them when I approached the eggs, I thought it best to sit down a few yards off and watch the birds return to their eggs. No sooner had I done so, than both species began to descend in dozens on to the spot where the eggs (about 30) were lying. In a moment a general fight commenced, and it was at once evident that the eggs belonged to *Sterna bergii*, and that the Gulls were carrying them off, and swallowing their contents as fast as they could devour them. So I jumped up and ran forward yelling like mad, and on reaching the spot found that even in that short time

the Gulls had destroyed upwards of a dozen. I took the remainder and proceeded in the direction of two more groups, which raised the number to 46. Other groups were collected on the island, but they had not yet laid, although they were sitting closely packed on their selected breeding-grounds. Having now walked all over the island I returned to the 'Amberwitch' for breakfast, after which I blew eggs till 3 P.M., and then returned to the island to see if any more birds had laid. I revisited the spots where I had taken eggs in the morning, but found no more eggs, although the birds were all sitting on the same ground in groups as closely packed as they were in the morning before their nests were robbed. I was beginning to despair of getting any more eggs, when my attention was attracted by a large group of birds which I had somehow missed in the morning. On approaching them, they rose as usual with a tremendous clamour, leaving 47 more beautifully fresh eggs for me to add to my collection. This swelled the number to 93, which is all I got. It seems evident that this species lays in groups to protect its eggs from the ravages of Gulls and other birds.

"I received another batch of eggs from the same place on the 19th June, numbering about 500. The man who took them said that they were laid in groups as described above, and usually three in each nest, never more. The eggs vary so much in coloration and marking that I shall not attempt to describe them, but will leave that difficult task to Mr. Hume.

"I may mention, however, that of the 600 eggs now before me scarcely two are alike, and some beautiful specimens have the ground-colour a sort of rich salmon-fawn, with markings exactly like Arabic characters. In fact, so like that some natives on board the 'Amberwitch,' when they saw the eggs, said that they were covered with Arabic writing, and when we told them that these birds always wrote their names on their eggs in Arabic with their bills, so as to know their own nests when they returned from feeding, they believed us. It is necessary to be very careful in blowing the eggs of this species, as the colours run and wash out if they are wetted in the slightest degree."

Colonel Butler adds:—"Writing to me from Ormarra on the 10th June this year (1878), Mr. Nash mentions that some fishermen have just arrived from Astolah with about 7000 fresh eggs of the Large Sea-Tern, and that they are offering them for sale as food at the rate of 60 for a rupee."

Captain E. R. Shopland, I.M., found a considerable colony of these Terns breeding on Oyster Island, near Akyab, in May. The nests were placed, or rather the eggs deposited, at intervals of about one foot, and in no instance were more than two eggs together. The sitting birds evinced great anxiety at Captain Shopland's approach, but were evidently very loth to leave their eggs; they shuffled about and screeched, but they would not move. The reason for this extraordinary conduct was soon apparent; the island was covered with hermit-crabs, all ready, when opportunity offered, to seize the eggs. Captain Shopland observed that the

eggs upon this island were of two types, a larger and a smaller; but he is certain that both belonged to *S. bergii*, for he shot many birds, and no other Tern was discovered at this spot. The largest egg measured 2·4 by 1·65 inch and the smallest 2 by 1·38.

Mr. H. Parker found this Tern breeding at Adam's Bridge, Ceylon, in June, and Mr. Nevill took the eggs in June from a rocky islet about 20 miles north of Galle.

The eggs are typically broad ovals, strongly pointed towards the small end, but considerably elongated varieties are not uncommon. The shell is strong and compact, but entirely devoid of gloss. The ground-colour varies from white, greenish and pinkish white, to pale buff, pale yellowish, and again pale pinkish stone-colour, to the richest and warmest salmon-pink. The markings are of two colours,—an intensely deep burnt-sienna brown, often quite black in its intensity, and a pale inky purple, which has an appearance of lying beneath the surface of the shell. In some eggs the inky purple markings are almost entirely wanting; in others they are almost more numerous and extensive than the dark ones. In some eggs these dark markings, which I may mention are of every conceivable shape and size, are comparatively thinly sprinkled; in others they are very dense. In some eggs they are huge blotches and spots, and in these eggs the markings always predominate about the large end, where in some eggs there is a broad zone, in others a huge more or less mottled cap. In other eggs the markings are almost entirely hieroglyphic-like lines, and in these eggs there is rarely any conspicuous cap or zone. In some few eggs all the markings are small and spotty, and in about 1 per cent. they are almost entirely wanting over the greater portion of the surface of the egg.

Of 25 eggs which reached me, no two were very closely alike, and for variety and richness of colouring they surpass as a body the eggs of any species with which I am acquainted.

In length they vary from 2·3 to 2·71, and in breadth from 1·63 to 1·78; but the average of two dozen was 2·45 by 1·71 \*.

\* *STERNA MEDIA*, Horsf. *The Allied Tern.*

Colonel Butler writes of the nidification of this species in the Persian Gulf:—“I received a magnificent series of eggs of the Allied Tern from an island close to the Island of Arabé in the Persian Gulf in 1878, numbering about 400. They are in character a good deal like the eggs of *Sterna bergii*, but of course considerably smaller.”

The eggs are typical Terns' eggs, ovals sometimes moderately broad, generally somewhat elongated, almost invariably decidedly pointed towards the small end. The shell is tolerably fine, but entirely devoid of gloss; the ground-colour is in most specimens nearly white, but in some has a slight pinky buffy tinge; the markings are always sparse; the primary markings are extremely dark, in some cases almost absolutely black, but where the colour is thinner showing a deep burnt-sienna brown. Some of these markings are moderate-sized blotches and spots, but almost every egg exhibits at least one or two, and many of them several, very large coarse irregular patches, almost black in the centre, but red-

*Sterna anæsthetæta*, Scop. *The Panayan Tern.*

*Onychoprion anasthætæs* (Scop.), *Jerd. B. Ind.* ii, p. 844.  
*Sterna anæsthetæta* (Scop.), *Hume, Cat.* no. 992.

When I visited the Vingorla rocks on the 4th February, 1875, I found all the higher parts more or less thickly clothed with coarse dry shaggy grass, which sprouted out of every nook and cranny, and had, moreover, established itself over every little plateau or tiny table-ground where the decay of the rock and the guano of the numerous sea-birds that frequent these rocks at the breeding-season had spread a thin sheet of mould.

Everywhere in amongst this grass were thousands of addled and rotten eggs, mostly broken and weather-beaten, but a very few of the smaller of the two kinds retaining their original colours tolerably well. What species the large eggs belonged to I cannot guess; there were very few of them, and all were much broken. They clearly belonged to some Gull, and were, I think, larger than those of *Sterna bergii* which I have from Astolah. In regard to the smaller species there could be no doubt, scores of dried-up mummies of the young birds and several nearly perfect dried-up skins of old ones of our present species lay about. I dare say I saw the remains of more than 100 young and old ones, and all belonging to this same species, not a single remain did I find of any other species; I have therefore not the smallest doubt that the few eggs which I was able to bring away also belonged to this species.

Colonel E. A. Butler received eggs of this species from the Persian Gulf. He says:—"A few eggs of the Panayan Tern (at least said to belong to this species) were taken for me by some fishermen about the 8th June, 1878. They were found on mud banks on the island of Tungistan, about 40 miles E. of Bushire, in the Persian Gulf, and the nests, which contained from two to four eggs (considerably incubated) each, were simply round depressions in the ground scratched out by the old birds. The eggs vary much in ground-colour and markings, some of them reminding one of the eggs of *Sterna saundersi*. I have no doubt about these eggs, as a skin of *S. anæsthetæta* was forwarded with them, and a note saying that there were no other Terns breeding on the island at the time they were taken."

He adds a couple of notes:—"A quantity of eggs taken on an island, 16 miles S. of Bushire, on the 13th July, 1878. The nest consisted of a slight depression in the sand just above high water-mark. Seldom more than one egg in a nest, sometimes two but never more.

"Lays but one single egg, very similar to the egg of *S. albigena*

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dish-brown towards the edges; many of the smaller spots are surrounded by a reddish-brown nimbus. The secondary markings the usual pale inky grey, a few in number and inconspicuous. Occasionally eggs are met with exhibiting scarcely any markings, a single blotch 0·2 in diameter, 20 or 30 tiny specks, and perhaps half a dozen tiny purplish-grey subsurface-looking spots.

The eggs vary from 1·91 to 2·35 in length, and from 1·38 to 1·5 in breadth.

but rather larger. They burrow about 1 to  $1\frac{1}{2}$  feet under shrubs or tufts of grass. Sometimes they lay on the ground under shrubs without burrowing, but never in an exposed situation. The eggs are always carefully concealed and consequently difficult to find. The eggs I found were all in a patch of grass and shrubs about 80 yards long, growing thickly together: no nest."

In shape the eggs seem to be normally very much that of a hen's egg, though somewhat more pointed and elongated examples occur. The ground-colour appears to vary from nearly pure white to a rich pinky stone-colour. The primary markings, often small, never apparently very large, and never very thickly set, are a rich reddish or burnt-sienna brown, becoming black in some spots; besides these, chiefly towards the larger end of the egg, a certain number of pale purplish-grey specks and spots are observable, occasionally they are pretty densely set about the large end, but in many eggs they are very sparse and small. The shell, as usual in these Terns, is very fine and close, but entirely devoid of gloss.

The eggs vary from 1.61 to 1.88 in length, and from 1.16 to 1.29 in breadth.

*Sterna dougalli*, Mont. *The Roseate Tern.*

*Sterna dougalli*, Mont., *Hume, Cat.* no. 985 bis.

Of the breeding of this Tern within Indian limits, Mr. H. Parker records the following very full note from Ceylon:—"June (Adam's Bridge).—On a small low bank there was a colony of some 200 pairs of this beautiful Tern, *all breeding*! The birds were extremely tame, settling on the nests when I was only 30 yards distant. At short intervals the whole flock rose in a cloud, screaming loudly, and after flying about halfway towards me returned to the eggs. Many, however, came on and made persistent swoops within two or three feet of my head, some of them almost alighting on it, uttering a loud scream at the time, with occasional hoarse notes. A bird noosed on the nest proved to be a male. Some twenty pairs of *S. sinensis* were breeding in this colony; as a rule, their nests were not mixed up with the others and were much more scattered. Some nests of *S. bergii* were in the midst of those of the Roseate Tern.

"The nests were from a foot to six feet or a little more apart, extending in a broad semicircle along the highest ridge of the sand, which was in no part more than two feet above the water-mark, and generally not more than six inches above it. At high tide some of the nests were evidently surrounded by water. All were small hollows scratched in the sand, from 4 to 6 inches wide, and from  $\frac{1}{2}$  to  $1\frac{1}{2}$  inch deep; some few contained a partial lining of shells, and in one instance a ridge of them was raised round the nest. The sand taken out of the cavity was usually deposited in a small mound round the nest.

"The number of eggs laid was either one or two—two in the greater number of nests. Their ordinary shape is a regular oval,

occasionally slightly pointed; but many elongated and stumpy eggs are also met with. Every intermediate gradation is found between a warm umber or sepia ground and a very pale grey stone-colour, in the latter case with a faint permanent greenish tinge. The eggs are spotted and boldly blotched and clouded with dark umber-brown or warm sepia, in some instances so dark as to be almost black, the deep tone often overlying a lighter one. All have inferior clouds and spots of light brownish purple or faint inky grey. Generally the markings exhibit a tendency to gyrate, but many exceptions occur. In a considerable number of cases they are chiefly clustered in a zone round the obtuse end, in these eggs being sometimes confluent, particularly in the browner specimens, and a few eggs have also scattered broken patches of the same colour as the other upper markings. Some have no blotches, and spots are spread almost equally over their whole surface. . . . The dimensions of twenty eggs are, mean  $1\cdot58 \times 1\cdot12$ ; maximum length  $1\cdot74$ , breadth  $1\cdot20$ ; minimum length  $1\cdot48$ , breadth  $1\cdot05$ ."

*Sterna melanauchen*, Temm. *The Black-naped Tern.*

*Onychoprion melanauchen* (Temm.), *Jerd. B. Ind.* ii, p. 844.

*Sternula melanauchen* (Temm.), *Hume, Rough Draft N. & E.* no. 991.

The Black-naped Tern breeds within our limits only, so far as is yet known, on the Andaman and Nicobar Islands.

For a magnificent series of its eggs, and for such information as I possess in regard to its nidification, I am indebted to Captain Wimberley.

It lays, according to the monsoon, earlier in some years, later in others, between the middle of May and the first week in August. Little rocky islets, a little detached from the main island and but for a little scrub entirely bare, seem to be usually chosen for nesting-places, if indeed this term may be used for a bird that lays its eggs either upon a little collection of small lumps of coral and stone on the bare rock, or in a little depression in the sand.

Two seems to be the full complement of eggs. The eggs vary very much in shape. Some are very perfect broad ovals, scarcely perceptibly pointed at one end, and others are decidedly elongated ovals, almost Plover-like in the way they are pinched out towards the small end; but the majority are intermediate between these two forms. The shells, though smooth and satiny in their texture, exhibit but little gloss. The ground-colour varies from creamy yellow or very pale buff to pinkish or greenish stone-colour, and is more or less sparingly, but usually boldly, blotched and spotted with a more or less sienna-brown, which in some spots is almost black. Besides these primary markings, as in all Terns' eggs, numerous clouds, spots, and blotches, in some eggs small, in some large and conspicuous, of pale purple or dusky lilac are scattered here and there about the egg, looking in some cases as if they were below its surface. In some spots the brown is excessively red, and

in others a reddish halo surrounds part of the spot as if the colour had run.

In a good many eggs there is a marked zone generally round the large, rarely round the small, end. In some all the markings are very feeble and washed-out, in others they are very bright and strongly defined. In some, again, they are small and comparatively numerous, while in one or two eggs they consist solely of three or four enormous blackish-brown and inky purple clouds. The eggs out of each nest are very similar, and can be picked out at once out of a large number; but the eggs of different nests differ to a remarkable degree, and yet possess a certain family likeness which would, I think, prevent their being mistaken for the eggs of any other of the Terns that breed with us. The eggs vary in length from 1·41 to 1·65, and in breadth from 1·06 to 1·2; but the average of thirty-six eggs is 1·56 by 1·12.

*Sterna fuliginosa*, Gmel. *The Sooty Tern.*

*Sterna fuliginosa*, Gm., *Hume, Cat. no. 992 bis.*

I found this species breeding in enormous numbers at the Cherbaniani reef, but when we visited the place, about the middle of February, almost all the eggs were hatched off and the reef was swarming with myriads of young birds; with all our care we could only find some thirty of their eggs, and all so hard-set that I only succeeded in preserving twenty-three of them after a hard day's work. There was no nest or attempt at a nest in any case. The eggs appeared to have been laid about promiscuously in any slight depression, either on the bare coral blocks or on the coarse coral sand between them. There was no separation between this species and the Noddies, and each egg, or pair of eggs, had to be watched until the parent settled down to it in order to make sure to which they pertained, for the eggs laid by both are too similar to permit of their being otherwise certainly separated.

The eggs of this species are very variable, both in size, colour, and markings. Typically they are moderately elongated, rather regular ovals, somewhat pointed, as a rule, towards the smaller end, but some are of the ordinary hen's egg shape, and a few are markedly elongated.

The shell is very fine and compact, but has no gloss. The ground-colour varies from white to pinky white, and from this latter to a yellowish pinkish stone-colour. The primary markings consist of large blotches, spots, streaks, and specks of a very rich brown, which on the pinkish eggs is often decidedly red, and on the rest is a sienna-brown (burnt or raw). The secondary markings, which look more or less as if they were beneath the shell, consist of spots and blotches of pale purple, lilac, purplish brown, or grey, the shade varying in different specimens.

The extent and character of the markings vary much. In some eggs all the markings are small and spotty, in others the majority

are large and bold; in some they are scattered evenly over the whole egg, in the majority they are most numerous about the large end; in some the markings are pretty densely set, in others they are very sparse.

In length the twenty-three eggs I was able to preserve varied from 1.86 to 2.03, and in breadth from 1.26 to 1.45, but the average of the lot is 1.96 nearly by 1.34.

*Sterna anglica*, Mont. *The Gull-billed Tern.*

*Gelochelidon anglicus* (*Mont.*), *Jerd. B. Ind.* ii, p. 836.

*Sterna nilotica*, *von Hass.*, *Hume, Rough Draft N. & E.* no. 983.

The Gull-billed Tern is common enough all over India in the cold weather, but very few indeed remain to breed with us, and these only in the far North-West. In Cashmere I have little doubt that they do breed, but no one has yet ascertained the fact. I have never found this species breeding in the North-West Provinces; indeed, it seems to leave these latter for more northern districts as soon as the hot weather sets in. That occasional stragglers at any rate breed in the North-west Punjab I have certain proof. On the 28th April, 1870, when searching a sand-bank in the Chenab a little below the bridge of boats between Wuzeerabad and Guzerat, I found a pair of the Gull-billed Terns breeding. They were by themselves. About fifty yards distant in one direction was a colony of *Glareola lactea*, and about seventy yards in another were a group of nests of *Rhynchos albicollis*. On the same sand-bank I found the eggs of *Sterna seena*, *Sterna minuta*, *Sterna melanogastra*, and *Esacus recurvirostris*. The pair of this present species were very tame, and allowed me to approach within ten yards before rising. When I walked up to the spot, I found a single egg in a considerable depression of a tiny sand mound, which was crowned by a dwarf bush of jhao (*Tamaria dioica*); I did not touch the egg (on either side and within a few inches of which the birds had been sitting), but retreated some twenty paces, on which both Terns immediately resumed their former position. As I moved, they again rose, and I shot the female (as it proved) as she was flying away.

The egg, which I secured, was perfectly fresh, whereas the eggs of all the other species were more or less hard-set. It was a rather elongated very perfect oval, measuring 1.78 in length by 1.28 in breadth, a typical Tern's egg in colouring, with a delicate greenish stone-coloured ground when fresh, now faded to a creamy drab, with numerous streaks, spots, and blotches of deep brown and brownish yellow, and more or less faint clouds of pale inky purple appearing to underlie the surface of the egg, which was almost entirely devoid of gloss.

There is to my mind no possible doubt of the authenticity of the egg, but it is somewhat smaller than those that Colonel Butler procured from the Persian Gulf. The egg closely resembles some

of those of *S. seena*, and though slightly *longer* than the longest egg of that species that I have ever seen (and I have seen some hundreds), it is still not quite so *broad* as one or two of those that I possess; and so I do not think there is any mistake about it.

Colonel Butler thus writes concerning the eggs of this Tern that he received from the Persian Gulf:—"On the 3rd April, 1878, Mr. Huskisson, Telegraph Department, at my request kindly sent a boat to the island of Warba, in the Kore Abdulla at the head of the Persian Gulf, and procured a fine series of the eggs of this species.

"There were two species of Terns breeding in separate colonies on different parts of the island, viz. *Sterna caspia* and the present species. In each case the nests, which were very abundant, were built about a foot apart and consisted of a small mound of sand scraped together by the birds, from 3 to 5 inches high, with small twigs and sticks laid on the top for the eggs to rest upon. Most of the nests contained three eggs, all more or less incubated. Skins of both species (*S. caspia* and *S. anglica*) were forwarded to me with the eggs for identification; and as there were no other birds on the island at the time, except a few Common Herons (*A. cinerea*) that had also just commenced breeding, I think there can be no doubt of their identity."

The eggs of this species do not vary much in size or shape. They are all moderately broad ovals and not unfrequently slightly pointed towards the small end.

The shell is extremely fine, hard and compact, but exhibits no gloss; the ground-colour varies from a greyish white through pale greenish, yellowish, and brownish stone-colour to a pretty decided brown; the markings are of two colours—one of more or less dark sepia-brown, becoming olivaceous where the spots are not dark, but in some spots becoming almost entirely black; the other a pale washed-out, subsurface-looking, inky-purple or grey-brown spots and clouds.

The character of the markings varies a good deal; in some they are mostly small and pretty thickly and uniformly distributed over the whole egg, in others they are large, thinly set, and in many cases chiefly distributed over the large end. In some eggs the secondary markings are very numerous and conspicuous; in others they are few in number and scarcely noticeable till the egg is looked at closely.

They vary from 1.83 to 2.2 in length, and from 1.35 to 1.57 in breadth.

### *Sterna hybrida* (Pall.). *The Whiskered Tern.*

*Hydrochelidon indica* (Steph.), *Jerd. B. Ind.* ii, p. 837; *Hume, Rough Draft N. & E.* no. 984.

The Whiskered Tern breeds not uncommonly in the North-West Provinces, Oudh, and parts of the Punjab, in large lakes and

broads. I have not yet heard of its breeding in Central or Southern India.

They lay in July and August. As a rule, their nests are placed towards the centre of some large jheel, where the water is deepest and no rice or rush grows, but where the surface is paved with the broad leaves of the water-lily and the lotus. On these they construct a slight platform of rush and weed, wound round and round in a circular form. Four seems to be the full complement of eggs.

Dr. Jerdon is mistaken in his statement that Mr. Brooks found this species breeding in the large churrs on the Ganges. Mr. Brooks disclaims having ever said anything of the kind; the only species of true Terns that do thus breed are *S. seena*, *S. melanogastra*, and *S. sinensis*. Far in the north-west, in the rivers of the Punjab, a few pairs of *S. anglica* remain to breed, and on the 28th April, 1870, as already noticed, I took an egg of this species on a sandbank of the Chenab two miles below Wuzeerabad. *S. hybrida* is essentially a marsh Tern, while with us *S. anglica* is not. The former lays in July and August.

I hardly think that even a tithe of the Whiskered Terns that visit us during the cold season remain to breed; the great majority, I believe, leave the plains and breed either in the hills, as in the Cashmere lakes, or else go further north. I only know of three or four places where they breed in the plains—I mean that I have myself seen—and these were in the Etawah, Mynpooree, and Meerut Districts. Messrs. Brooks and Anderson have each, I believe, found two or three of their breeding-haunts, but no others of my correspondents appear to have obtained the eggs; and when we remember how very plentiful this Tern is in many localities during the winter, the conclusion that the great mass leave us to breed elsewhere is irresistible.

This Tern is very common during the summer in Cashmere. The birds were breeding when the first Yarkand Mission passed in June, and many nests were taken in a marsh close to Sirinugger, about a mile from the "Visitors Reach" and on the opposite side of the river. The nests were made of green rushes, placed in amongst rushes, reed, and floating weeds, and were very scanty. A year or two later Mr. Brooks and Major Cock took numbers of their nests on the Wuller Lake early in June, and Dr. Stoliczka found them laying a second time there on the 26th July. All the three breeding-places I have seen were precisely alike. I quote an old note recorded at the time about one of them:—

"August 14th, Achulda Jheel, Zillah Etawah.—In the centre of the jheel, where the water was deepest and no rice or rush grew, but where the lake was paved with lotus and lily-leaves, a small colony of these birds had established itself. On the broad leaves of the lotus they had built loose slight nests of rice and rush-stems, and in these we found their eggs. Only two nests contained three eggs each, the others two and one. All the eggs were perfectly fresh. The birds had obviously only just begun to

lay. There were not less than twelve or more than twenty couples. We shot one, a female, which we preserved. Whilst the nests were being robbed, the birds whirled round and round the men's heads, continually emitting their hoarse screaming cry."

The late Mr. A. Anderson wrote that when at Fyzabad (Oudh) in 1867, he one day early in July came across a vast assemblage of these Terns, flying about a swamp about a mile in circumference, distant only about two miles from the town and within a stone's throw of the main road and of a village that overlooked the water. The swamp was one mass of tangled weeds and aquatic creepers, and watching the birds he soon discovered that they were constructing on these floating nests, bringing for the purpose long wire-like weeds, some of them two feet in length, from different parts of the swamp. He goes on to say:—

"On the 7th July we again visited the place, taking a small canoe with us, which was pushed through the rushes and weeds with the greatest difficulty, and we were soon rewarded with as many eggs as we could carry home.

"Each nest contained one, two, or three eggs, though possibly four may be the proper number had we allowed the birds sufficient time to lay the full complement.

"The circumference of some of the nests I measured ranged between  $3\frac{1}{2}$  and 4 feet, and they were about 4 inches thick. They were composed entirely of aquatic plants, and so interwoven with the growing creepers that it was impossible to remove them without cutting at the foundation of the structure."

In India, so far as we yet know, they always make their own nests, generally, as already mentioned, on the surface of floating leaves, but sometimes on tufts of water-grass. It may, however, be well to note that in Northern Africa Canon Tristram found a whole colony of them breeding in the deserted nests of the Eared Grebes, and possibly in some parts of India they may similarly appropriate the old nests of other species.

The eggs of this species are moderately broad ovals, a good deal pointed towards one end. The texture is very fine and close, but they have little or no gloss.

The ground-colour varies, and is sometimes a pale olive stone-colour, sometimes an olive-brown, sometimes a bright decided green, or a rich or pale blue-green, sometimes a greenish grey, but most commonly a pale clear olive-green. The markings, which are generally pretty numerous, consist of streaks, spots, and blotches of deep blackish brown, umber-brown, or reddish brown, and of a number of very pale purplish-brown clouds, streaks, and spots underlying the primary markings. Sometimes the markings are all very small and niggling, sometimes they are large and bold. In a considerable number of eggs the majority of the markings are towards the large end, and not a few exhibit there a bold blotchy irregular zone. Some of the eggs have a very Snipe-like character, with large oblique blotches; some have only very small

specks or spots, while others remind one much of many types of Plovers' eggs.

In length they vary from 1.39 to 1.65, and in breadth from 1.02 to 1.15; but the average of forty-eight eggs is 1.51 by 1.09.

**Sterna seena, Sykes. *The Indian River-Tern.***

*Seena aurantia (Gray), Jerd. B. Ind. ii, p. 838.*

*Sterna seena, Sykes, Hume, Rough Draft N. & E. no. 985.*

The Indian River-Tern breeds throughout the Empire on sand-banks in, or on the sandy banks of, our larger rivers. I am not aware that it ever breeds in lakes or swamps, or in the hills either of Southern or Northern India. I do not know at what season it lays in Southern India, but in the Ganges and Jumna and their various affluents, the Brahmapootra and the Irrawaddy, the majority seem to breed in March, while in the Indus and its affluents they scarcely begin to lay till the second week of April.

The only nest they make is a small depression in the bare sand.

As a rule several pairs breed within hail of each other; and generally where you find the eggs of this species, there you will find not far off those of the Small Swallow-Plover (*G. lactea*), of the Indian Skimmer, of the Black-bellied Tern, and the Great Stone-Plover. Three is the full complement of eggs. At the season at which all these Terns lay, the bare white glittering sands on which their eggs are deposited are often at noon tide too hot to touch; and accordingly during the daytime the birds seem to trust to the heat of the sun to hatch the eggs, and are rarely to be found on their nests; they pass the time wheeling round and round above, or snoozing beside them. By nightfall every egg is covered by one or other of the parent birds, and when it is dark they sit so close that it is easy to catch them with a common butterfly-net.

I reproduce a couple of old notes on the nidification of this species:—

"We procured numbers of eggs of this species on the 12th and 13th March in shallow circular depressions in low sandbank islands of the Jumna near Sheregurh. Three was the greatest number that we found in any nest. The birds did not appear to have long commenced laying, as all the eggs were fresh. It is not amongst rocks or rocky reefs, where so many of the Great Stone-Plovers and Lapwings are nesting, that we found its eggs, but on bare low spots of sand from 2 to 3 feet above the present river-level. On one occasion we found a solitary nest, but usually several pretty near together. On one bank, within a compass of a hundred yards, we found these, the Indian Skimmer, the Black-bellied Tern, and Small Swallow-Plover, all breeding, each species, however, keeping pretty much to its own locality. The vigorous manner in which these River-Terns attack and chase away Crows,

Kites, and similar would-be robbers from the immediate neighbourhood of their nests is very noticeable. To me they seemed to show more solicitude for their eggs than any of the other species breeding near them. It is impossible to doubt when they have eggs anywhere near ; the way they flash backwards and forwards and wheel round and round overhead, incessantly repeating their shrill plaintive cry, at once reveals the existence of the treasures they are so anxious to preserve ; but for this the search for their eggs would be weary work, as it is only when quite close to them that they catch the quickest eye, and I have myself seen ordinarily observant persons (not of course specially on the look-out for, or thinking of, eggs) walk right across a bank on which there were some fifty nests of this and kindred species, almost stepping on some, without ever noticing a single egg.

“April 6th.—Revisited all these sandbanks, but found very few eggs ; the great majority had clearly hatched off, and those we did find probably belonged to birds that we had robbed, since we found none on those banks where, having quite as many eggs as we wanted, we did not meddle with the nests we saw.

“I found many nests, each containing three hard-set eggs, of this species on a series of sandbanks in the Chenab, near Wuzeerabad, on the 28th April. On the 9th April I had taken several fresh eggs (in no case more than two in any one depression) on sandbanks on the Jhelum, between the station of that name and Pind Dadan Khan. As a rule, one does not find numerous pairs of this species breeding on the *same* sandbank, and though they always lay on banks occupied by other species also, they almost always keep a good many yards apart from each other and other species.”

Writing from Tipperah, the late Mr. Valentine Irwin remarked : “The large River-Tern (*S. seena*) lays during March with us. The eggs I sent you were obtained on the 15th of March on sand-banks in the Megna, about 20 miles below the Dacca Road.”

From Pegu, Mr. Eugene Oates writes that this species is “abundant throughout the whole length of the Irrawaddy and Sittang rivers, where it lays on the numerous sandbanks in the middle of March. In the extensive plains round Pegu it is common in all the tidal creeks. In these localities, I think, it nests in paddy-fields and waste ground covered with short grass.” This latter belief, however, I do not share.

Writing of this species and *Sterna melanogastra*, Major Wardlaw Ramsay says :—“Both these species breed in large numbers on the sandbanks of the Sittang in March, April, and May.”

Typically the eggs of this species are broad ovals, scarcely pointed at either end. The eggs have little or no gloss, though the shell is very smooth and fine. In ground-colour, extent and character of markings they vary excessively, and yet there is a certain family resemblance amongst all the eggs of this species, which prevents their being confounded with those of any of our other Indian Terns with which I am acquainted. The ground-

colour is sometimes a delicate greenish grey, sometimes pale greenish stone-colour, most commonly perhaps a sort of buffy stone, occasionally, when fresh, slightly tinged with pink, and sometimes suffused with olivaceous. The markings, too, vary much in shape, size, and character. Typically they have small blotches, lines, and streaks pretty thickly sprinkled over the whole surface of the egg, at times quite hieroglyphic-like ; but in some specimens the blotches are large and few in number, and occasionally they consist of long streaks, reminding one of the characteristic markings of *Rhynchos albicollis*. Whether large or small, streaks, lines, spots, or blotches, as the case may be, besides these primary markings, which are deep brown of one shade or another, there are secondary markings underlying these, clouds and streaks of pale inky purple, which convey an idea of being beneath the surface of the egg.

In length the eggs vary from 1.5 to 1.75, and in breadth from 1.17 to 1.32 ; but the average of sixty eggs is 1.65 by 1.25.

*Sterna melanogastra*, Temm. *The Black-bellied Tern.*

*Sterna javanica*, Horsf., *Jerd. B. Ind.* ii, p. 840 ; *Hume, Rough Draft N. & E.* no. 987.

The Black-bellied Tern, like the Indian River-Tern, breeds all over the Empire in the same situations as that bird, and usually more or less in company with it. March is the breeding-season in the North-West Provinces, April in the Punjab, and apparently in Southern India they lay in both months.

Their nests are mere depressions in the sand of sandbanks in the beds of rivers and surrounded by water ; and while the usual number of eggs is three, I have repeatedly found four eggs in the nests of *this* species.

I have a couple of notes in regard to the Black-bellied Tern :— “ We took many of the eggs of this species near Sheregurh on the Jumna on March 12th and 13th, 1867. They were in every case breeding in company in low, bare, water-surrounded sandbanks. No nest that we found contained more than three eggs, but on many nests (mere shallow circular depressions in the dry sand) the birds were sitting, and many of the eggs were ready to hatch off. They seem to lay earlier than the River-Tern (*S. seena*), which again I take to be somewhat earlier than the Skimmer. The birds I fancied were bolder than *S. seena*, as when, after looking at their eggs without touching them, we retreated thirty or forty yards, the sitting birds at once resumed their positions on or beside the eggs. On the same banks we found parties of the Skimmer, *S. seena*, and the Lesser Swallow-Plover breeding, each party keeping pretty well to its own quarters. The eggs are generally dull and glossless. Of quite fresh eggs the ground-colour is a greenish stone-colour, but as incubation proceeds they assume more of a *café-au-lait* hue. The markings are generally feeble, a more

or less warm brown and a dull faint purplish brown, rather sparsely distributed in spots, specks, and tiny blotches. Some eggs almost entirely want the dark brown, and these have a very dull dead appearance indeed. In shape they are a round oval, and do not vary very much.

“ By April 6th these had almost all hatched off. There were a few eggs, second layings, at places where we had robbed the nests.

“ I found quite fresh eggs of this species on sandbanks in the Jhelum, near Pind Dadan Khan, on the 9th April, and hard-set ones (*four* in some nests) on a bank in the Chenab, near Wuzeera-bad, on the 28th April 1870. Like *S. seena* and unlike *Rhynchos albicollis*, this species rarely breeds together in considerable companies. Two or three pairs are the most that are usually found on one bank, and even these two or three commonly keep pretty well apart.”

Captain Burgess, speaking of his experiences in the Dekhan, remarks:—“ While walking on a sandbank in the midst of the River Bheema, I was beset by a pair of these Terns, and on looking about on the ground found two eggs deposited in a slight hollow scraped in the moist sand not far from the edge of the water. These birds, when flying over head, utter a cry very like the chirp of a Sparrow. They breed during the months of March and April, laying two eggs of a rich stone-colour, spotted chiefly round the centre, and more sparingly over the larger end, with grey and light brown spots, and measure an inch and rather more than two-tenths in length by an inch in width.”

Mr. Oates tells us that “ it breeds commonly on all the sand-banks of the Irrawaddy. Eggs, three in number, deposited on the bare sand. Lays in the middle of March.”

In shape the eggs are moderately broad ovals, distinctly pointed towards one end. As a body, they are considerably more elongated than those of *S. seena*. In colour the eggs run through various shades of creamy, buffy, and *café-au-lait* grounds (occasionally, when quite fresh, with a faint greenish, or again pinky tinge), but vary far less than those of *S. seena*. The markings consist usually of small specks, streaks, and spots, not very thickly set, and occasionally of a few large blotches, all these of reddish or purplish brown; and besides these of numerous faint hazy spots, clouds, and streaks of pale purple, which underlie the first-mentioned markings and seem to be more or less beneath the surface. The eggs are almost perfectly glossless, far more so than those of *S. seena*.

In length the eggs vary from 1.10 to 1.5, and in breadth from 0.88 to 1.02. I have had at one time or another at least a hundred of these eggs, but I seem to have only eleven by me now, and the average of these is 1.25 by 0.95\*.

\* *STERNA ALBICENA*, Licht. *Lichtenstein's Tern*.

Colonel Butler received eggs of this species from the Persian Gulf. The gentleman who took them thus writes:—“ As requested I made another trip

*Sterna sinensis*, Gmel. *The Eastern Ternlet*.\*

*Sternula minuta* (Linn.), *Jerd. B. Ind.* ii, p. 840; *Hume, Rough Draft N. & E.* no. 988.

The Ternlet seems to be pretty generally distributed throughout all the larger rivers of the Empire. According to my experience it rarely extends quite to the sea-coast or fishes in pure sea-water. In the cold season it is more plentiful about the estuaries and the lower portions of river-courses, but for breeding-purposes it goes higher up inland.

In India this species breeds from the middle of March to the beginning of May, according to locality, those in the south beginning earlier and those in the north later; but whether they are early or late they always lay later than the other species, *Sterna seema* and *S. melanogastra*, *Rhynchos albicollis* and *Glareola lactea*, all of which commonly breed on identically the same sandbanks. It is almost needless to say that the eggs, four in number, are laid in a slight depression in the bare sand on some entirely water-surrounded bank in a considerable-sized river. Personally I have taken but few eggs, comparatively speaking, of this Ternlet. Such few notes as I have recorded I quote:—

“*Etawah, March 12th.*—I have scarcely ever noticed this bird here in the cold weather, but to-day I have seen a good many near

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on the 10th June to the island of Allah, about 40 miles E. of Bushire, where the eggs you got last year were taken from. At low tide it is one island, but at high tide becomes two, from low ground in the centre becoming submerged. *Sterna albigena* was breeding on one, and *Sterna anastetha* on the other. The former (*S. albigena*) lays in the open on the bare ground, no nest, but in some instances a few pieces of twigs were observable. Eggs in number one or two, not more. One egg was peculiar, being almost white without any spots. The bird was shot off the nest, so there could be no mistake.”

The eggs of this species, like those of most of the Terns, vary a good deal in size, shape, and colour. Typically they are moderately broad ovals, somewhat pointed towards the small end, but some specimens are quite of the hen-shaped type, others are broader and slightly pyriform, while I have three or four very elongated ovals markedly pointed towards the small end. Typically the ground-colour is a moderately pale brownish-yellow stone-colour, but occasionally this brightens to a warm *café-au-lait*; in many it is only creamy, and rarely it is almost pure white. Typically, again, the markings are neither very large nor very dense. Moderate-sized blotches, specks, and spots of a brown, varying from deep umber-brown, almost black, through a variety of shades to almost sepia-brown. In some eggs all these primary markings are very small. One egg in twenty exhibits a few good-sized blotches. Besides these primary markings, all the eggs exhibit more or less numerous grey or pale inky-purple subsurface-looking streaks, clouds, and spots. In one or two eggs the primary markings are entirely wanting, and they exhibit nothing but these secondary ones. One egg we got had the ground white and was absolutely devoid of all markings. Variations like this occur in most species; even in highly coloured eggs like those of *Ædicnemus scolopax* similar white varieties occur. The texture of the shell is fine and compact, but it is entirely devoid of gloss.

The eggs vary from 1·48 to 1·71 in length, and from 1·07 to 1·21 in breadth.

\* Owing to the difficulty of assigning the notes on the breeding of the Ternlet to the various races into which Mr. Hume divides the Indian birds, I have been obliged to include them all under one name.—EP.

Sheregurh in the Jumna, and though as yet we have found no eggs, it is doubtless for breeding-purposes that they have come up here.

“Numerous eggs received from Mirzapoor on the Ganges, where it breeds like the other Terns on sandbanks. The eggs, taken on the last day of March, were mostly fresh. Those before me are rather long and pointed. The ground-colour, amount and intensity of markings, as well as the shape of the eggs, vary much; one is a buffy stone-colour, with well-marked dark reddish-brown specks and spots and tiny blotches, and a number of dimly-seen very pale purplish-grey secondary markings; another egg is a pale cold grey stone-colour, with numerous, feeble, faint purplish blotches and spots dimly seen as if below the surface, and just a few brown specks; another is very similar to this latter, but with far more of the dark primary markings, which are a purplish brown.

“Between April 4th and 8th I secured a number of these eggs on sandbanks of the Jumna and Chumbul, specially near Bhurrey, all or nearly all fresh. They are therefore decidedly later breeders than the other Terns. These eggs vary much in ground-colour; in some this is pale olive-brown, in some pale reddish brown or *café-au-lait* colour; in some it is very pale green, in others almost pinkish. The general character of the markings are spots, small blotches, and a few specks of a rich dark brown (which in some is blacker, in some more purple, and in some redder), with blotches and spots of a sort of subsurface-looking faint purple or lilac. None of the eggs seem to have *any* gloss, whereas there is often a good deal and *always some* in the case of those of *S. seena* and *Rhynchos albicollis*, and occasionally a little where those of *S. melanogastra* are concerned. In some the markings are thickly, in some sparsely, sown over the whole surface. In some they form a sort of zone near the larger end, while elsewhere there are few. In some too, in fact generally, the spots and blotches are roundish, but at times they are long streaks similar to those so common on Skimmer's eggs. They are proportionally more oval eggs as a rule (I mean longer and less broad) than those of *S. seena* and *S. melanogastra*.

“I found three nearly fresh eggs of this species on a bank in the Chenab, near Wuzeerabad, on the 28th April. This species appears everywhere in India to lay later than the other species, in company with which it breeds. This is perhaps the rarest of our common river Terns, and its eggs are far less easy to procure than those of the others.”

In the case of this and other Terns I have quoted descriptions written with the fresh eggs before me, besides giving a full description taken from those in my collection—1st, because the eggs do vary so that no one description written at one time can quite adequately embrace *all* varieties; and 2nd, because these eggs, more perhaps than any others, change colour with keeping, even though all light be rigidly excluded.

Colonel Butler writes \*:—"At Kurrachee, on the 6th May, 1877, I noticed several of these Terns flying backwards and forwards over the Maidan between the Camp and Clifton. As they had only just arrived, and as they appeared much devoted to the spot and bent on matrimonial pursuits, I got out my trap and commenced a search for eggs. The soil was slightly damp from the effect of tidal inundations, with here and there patches of hard dry incrustated ground, covered with saline efflorescence, and on these patches the nests were situated. I also found nests on the same maidan, on ground cut up by Artillery gun-carriages, the eggs being deposited in the wheel-ruts and in the horses' footprints.

"None of the nests I examined contained more than two eggs, which seems to be contrary to Mr. Hume's experience; and I may also observe that the birds in this neighbourhood feed exclusively in salt water, being common all over the harbour and in the salt-marshes adjoining. In one instance the eggs were deposited in the centre of a small heap of stones lying out on the open maidan.

"The dates upon which the nests were found are given below:—

" May	6th.	3 nests each containing 2 fresh eggs.
"	6th.	1 nest                   "                   1 fresh egg.
"	6th.	1   "                   "                   1 slightly incubated egg.
"	9th.	5 nests                   "                   2 fresh eggs.
"	9th.	1 nest                   "                   1 fresh egg.
"	10th.	4 nests                   "                   2 fresh eggs.
"	12th.	1 nest                   "                   2                           "
"	12th.	2 nests                   "                   1 fresh egg.
"	12th.	1 nest                   "                   2 slightly incubated eggs.
June	4th.	2 nests                   "                   2 fresh eggs.
"	4th.	3   "                   "                   2 slightly incubated eggs.
"	6th.	1 nest                   "                   2 incubated eggs.
"	6th.	1   "                   "                   1 fresh egg.
"	6th.	1   "                   "                   1 chick about a week old.
"	11th.	1   "                   "                   1 slightly incubated egg.
"	11th.	1   "                   "                   1 chick about a week old [and a stale egg.]

He subsequently added:—"These birds bred again plentifully on the same ground, at the same season, the following year."

The eggs found by Colonel Butler are uniform in tint; a very pale drab or clay-brown, or slightly yellowish or greenish stone-colour. The primary markings are moderately dark umber-brown (the exact shade, however, varies), mere specks and tiny spots as a rule, thinly scattered about the egg, with here and there just a few rather larger irregular-shaped smears and blotches, or rarely little lines of the same colour. The secondary markings are quite

\* The birds, the eggs of which Colonel Butler found at Kurrachee, belong to *S. saundersi*, Hume.—ED.

as numerous, in some eggs more so, and average larger; they are a delicate pale lilac-grey. The shape is typical, moderately broad ovals, decidedly pointed towards the small end. The shell is very fine, but quite glossless.

Mr. H. Parker writes of this species:—"June (Adam's Bridge). There were several nests of this Tern on various banks. They were barely above high-water mark; one was below it. Two of the birds settled on the nests while I was near. The mean dimensions of 20 eggs are 1·21 inch by 0·94. I observed all the birds carefully, but saw no *S. saundersi*."

In Ceylon this species, according to Colonel Legge, breeds from June to August.

Normally the eggs of this species are long ovals, distinctly pointed at one end. There is a regular gradation in size and shape in the eggs of *S. seena*, *S. melanogastra*, and *S. sinensis*. The first are much the largest and roundest, the next are smaller and more oval, the last are smaller still and most elongated of all. The ground-colour varies much, but the two commonest shades are a very pale drab colour (with, when fresh, a faint greenish tinge) and a warm *café-au-lait* colour. All kinds of intermediate shades, creamy, buffy, and greyish stone-colours, occur, but the commonest are those first described. The markings, as usual in these Terns, consist of streaks, blotches, and spots of different shades of deep brown, with underlying clouds and spots of faint inky purple. As a rule, the markings in this species are, I think, bolder, larger, and more streaky than those of *S. melanogastra*, which are smaller and more niggling. The eggs as a rule are entirely destitute of gloss.

In length the eggs vary from 1·15 to 1·3, and in breadth from 0·88 to 1·01; but the average of a large series is 1·25 by 0·94.

#### *Anous stolidus* (Linn.). *The Common Noddy.*

*Anous stolidus* (Linn.), *Jerd. B. Ind.* ii, p. 845; *Hume, Cat.* no. 993.

We found this species breeding in great numbers on the Cherbaniari reef, but saw it nowhere else in the group. When we visited the reef in the second week in February, the birds had only just begun to lay, and we only procured a few quite fresh eggs.

The few eggs that I secured were barely, if at all, separable from those of *S. fuliginosa*, except that they seem to average somewhat larger, and to be somewhat more elongated in shape and more richly coloured.

I only secured eight, and these are all more elongated and more decidedly pointed than the great majority of the eggs of *S. fuliginosa*. The markings, too, in some specimens are perhaps somewhat more brightly coloured than in any of the eggs of this latter

species, but with this exception the description already given of the eggs of the one will answer perfectly for those of the other.

My specimens varied in length from 1.9 to 2.25, and in breadth from 1.33 to 1.46; but the average of eight is 2.08 nearly by 1.38.

**Rhynchos albicollis, Swains. *The Indian Skimmer.***

*Rhynchos albicollis, Swains., Jerd. B. Ind. ii, p. 847; Hume, Rough Draft N. & E. no. 995.*

The Indian Skimmer or Scissor-bill breeds throughout the Empire on bare sandbank islands in the larger rivers. In the Ganges and its affluents the majority seem to lay in March; in the Indus and its tributaries in April.

It makes no nest, only scrapes a small hollow in the bare sand, from a foot to three feet above the water-level, and there it lays its eggs, the full complement of which is four. I have nothing to add beyond what will be found in the two old notes that I reproduce:—

“These birds were breeding on the 12th and 13th March, on low bare, water-surrounded sandbanks in the Jumna, near Sheregurh. In one nest we found three eggs, and on this the old bird was sitting; but in every other case (and we found something like twenty eggs) only one had as yet been laid. The eggs are laid in a circular depression, which may be  $1\frac{1}{2}$  inch deep and 4 inches broad, in the bare, dry, white sand. In all cases several pairs were breeding close to each other, and generally the Large River and Black-bellied Terns were also breeding somewhere near. Judging from the eggs, this bird lays a little later than either of these species. Whilst we were robbing their nests, they flew about in the neighbourhood uneasily, pretty often uttering shrill cries, but not on the whole seeming so much put out by, or so ready to resent, our interference and intrusion as *S. seena*. Compared with those of these latter, their eggs are somewhat small. Compared with those of both *S. seena* and *S. melanogastra*, their eggs are long and narrow. They vary somewhat in ground-colour, this being in some greyer, some greener, and some more buffy. A faint, almost pinky, tinge is noticeable in some. Of course in this and other similar eggs (I am writing with the fresh unblown ones before me) when blown and old, all the delicate shades fade and the eggs lose half their beauty. The character of the markings on all are very similar, pretty large bold chocolate-brown blotches, with a few smaller spots of the same colour, and a few faint purplish blotches and secondary markings of a *quasi* subsurface character. In some the blotches are numerous, but they are never very thickly set, and I have specimens with so few of them, that on one side at least the egg is nearly unicolorous.

“By 6th to 8th of April all seemed to have hatched off except second layings, where we had robbed the nests before.

"On the 28th April, 1870, I took over one hundred eggs of this species off a sandbank in the Chenab, near Wuzeerabad. On the 6th April not one egg was laid. On the 28th almost all the depressions (I cannot call them nests) contained four eggs ; many were ready to hatch off, and there was not one quite fresh egg amongst the lot. As usual, the eggs, which pertained to some thirty odd pairs, were all placed in the same immediate neighbourhood, a little apart from those of the other Terns and Swallow-Plovers breeding on the same bank. The eggs were on perfectly bare sand. Others portions of the bank were thinly sprinkled with tiny jhao bushes, but they had chosen a perfectly bare flat, some 50 yards from the water's edge and some 2 feet above its level. Whilst we were robbing their eggs, they flapped lazily round about us, keeping, however, out of shot and keeping up all the while a ceaseless twittering cry. I may add that on the 9th April I took a few quite fresh eggs of this species (which had obviously only just commenced to lay) on sandbanks in the River Jhelum between the station of that name and Pind Dadan Khan."

The eggs of this species vary but little in size and shape. They are moderately broad ovals, more or less pointed towards one end, some having a very decided point, almost like a Grebe's eggs. The texture of the shell is fine and compact, and they have a slight gloss. The ground-colour varies much, but the markings are very characteristic and uniform in their character. These eggs fade much, as indeed do most of those of this family ; but when fresh the ground-colour exhibits a variety of delicate and beautiful tints—pale pinky buff, cream, or stone-colour. Delicate greenish or greyish white, pale *café-au-lait*, and pale salmon-colour are amongst the most common. The markings consist of bold blotches and streaks, chiefly the latter, of rich umber, chocolate, or reddish brown, occasionally so intense as to be almost black, underlaid by similar streaks and blotches of more or less pale inky purple. In the majority of the eggs the markings, as a whole, have a remarkably streaky character, the streaks running not parallel, but at an angle of about  $30^{\circ}$  to the major axis, seeming to be, as it were, twisted round the egg. The markings appear always to turn in the same direction, and holding the egg with the broad end uppermost and calling that the north, they have a set, if I might so describe it, from N.N.E. to S.S.W.

In length the eggs vary from 1.45 to 1.76, and in breadth from 1.08 to 1.28 ; but the average of one hundred and eight is 1.6 nearly by 1.18. I notice that the Punjab eggs are longer than those of the North-West Provinces. Forty-three of the latter average only 1.55 by 1.18, while sixty-five of the former average 1.63 nearly by 1.18.

## Family GLAREOLIDÆ.

*Glareola pratincola* (Linn.). *The Collared Pratincole.*

*Glareola pratincola* (Linn.), *Hume, Cat.* no. 842 bis.

Mr. Scrope Doig found the eggs of this Pratincole in Sind. He says:—"On the 4th May I came across a lot of birds which were new to me, and so I shot some to identify; from the persistent way in which the others kept flying round and round I concluded that they must be breeding, and on searching for their nests I found some half dozen all empty, and so thought that they were beginning to lay. I accordingly left the place, and returned on the 7th, when I found after searching about that what I had taken for new nests were really old ones, the place round about being covered with the broken egg-shells; however, by patient searching I collected over fifty eggs. The breeding-ground was about 15 acres in extent (the actual portion where most of the nests were was only about an acre), and was a salt plain with patches of coarse sedge here and there on it, the whole being surrounded by dense tamarisk and rush jungle, and was situated about half a mile from the bank of the Narra. The nests were slight hollows scraped in the ground, and were generally situated close to where the soil had been rooted up by wild pigs, or in the centre or by the side of a lump of dried cowdung: this latter was the favourite situation. The greatest number of eggs in any nest was three. This seemed to be the normal number, but some contained only two, and one had a single egg and one young one just hatched. I shot several specimens, which I have preserved and sent to Mr. Hume for identification along with their eggs. I also found *Cursorius coromandelicus* and *L. indica* breeding in the same place. These birds have a most peculiar habit of lying stretched on the ground with their wings spread out; they not only did this while I was visible searching for their eggs, but when I had disappeared and lay hid in the dense jungle I saw them through my glasses going through the same antics; as far as I could judge, it was done when any other birds approached the nest or young, and was evidently a sign of anger. Two birds which I shot while thus extended were both males. The ground-colour of the eggs is a light dirty green in some, in others a drab, covered all over with dark purple blotches, denser in some than in others and sometimes forming a zone at the broader end; some are in shape broad ovals, others nearly spherical: they vary in length from 1.1 to 1.35, and from .80 to 1.05 in width, the average of fifty-two eggs being 1.46 in length and .95 in width."

The eggs of this species are really not separable from those of *G. orientalis*, and no separate description of them is therefore necessary. They vary in size from 1.04 to 1.29 in length, and from 0.82 to 0.98 in breadth.

*Glareola orientalis* (Leach). *The Eastern Pratincole.*

*Glareola orientalis*, *Leach*, *Jerd. B. Ind.* ii, p. 631; *Hume, Rough Draft N. & E.* no. 842.

I have been unable to ascertain anything in regard to the nidification of the Eastern Pratincole or Larger Swallow-Plover in India. Mr. Blyth, however, tells us that "it breeds sometimes in the neighbourhood of Calcutta, where I have seen two or three brought to the provision bazaar too young to fly. A specimen, with the feathers half-grown, is mounted in the Calcutta Museum, and another which must have been bred at no great distance."

Mr. Oates, however, found numerous eggs in Pegu. He writes:—"I have found eggs of this species from the 16th April to the 1st May, on which latter date some eggs were fresh, but others much incubated. Three appears to be the maximum number of eggs, but two only are more frequently laid. The eggs are deposited on the bare ground, burnt up sandy paddy-fields being much frequented. No great number of birds breed together, nor have I ever found two nests very close to each other. The finding of eggs is consequently very laborious work. When disturbed, the sitting bird flies round one's head for a short time and then goes away. But when the young are lying hid, then the birds display great anxiety, and it is on these occasions that the bird squats on the ground with wings outspread and neck stretched out. I fancy this action is meant to counterfeit lameness, and so draw the intruder off the scent."

"The young bird runs as soon as it is hatched. Its colour is a mixed pepper and salt, the black preponderating."

The eggs of this species are undistinguishable from those of *Glareola pratincola*. In shape they are broad ovals, as a rule Plover-like, distinctly pointed towards the smaller end; the ground-colour varies from almost white through all shades of greyish, yellowish, and drabby stone-colour, to an almost olive stone-colour. The primary markings consist of blotches, streaks, specks, and spots pretty thickly set about the whole egg, but not unfrequently more densely towards one end, of a brown which is almost black in most spots, but which when thinly laid on varies from sienna to an umber-brown. These markings are very Plover-like, and as in the other Plovers vary a great deal in size and density in different eggs. Besides these primary markings, there are usually a great number of pale sepia clouds, spots, and blotches scattered about the egg, usually most thickly where the primary markings are thickest.

The eggs more resemble those of *Cursorius gallicus* and *C. coromandelicus* than any others, but the markings are more blotchy and less scratchy, and the eggs themselves are less broad and more Plover-shaped than are those of the Coursers.

In size the eggs vary from 1.12 to 1.25 in length, and from 0.9 to 0.96 in breadth; but the average of a considerable series is 1.18 by 0.93.

*Glareola lactea*, Temm. *The Small Pratincole.*

*Glareola lactea*, Temm., *Jerd. B. Ind.* ii, p. 632; *Hume, Rough Draft N. & E.* no. 843.

The Small Pratincole or Lesser Indian Swallow-Plover breeds on sandbanks throughout the Indus, Ganges, Brahmapootra, Irrawaddy, Nerbudda, and Mahanuddy, and their many affluents, so far as they continue to be broad streams, flowing peacefully when not in flood. To which others (if any) of our Indian river-systems they resort to breed, I do not yet know. Further information on this subject is much to be desired.

It is always a social bird, and even in the breeding-season from ten to fifty pairs always keep together.

Like the Collared Pratincole in Greece and elsewhere in Southern Europe, our Indian bird always breeds in company with various species of Terns; with these latter it usually chooses a low flat sandbank in the middle of the river, if possible one never visited, and in some part of this, not intermingled with, but usually a little apart from, the Terns, it makes its nest, the whole party of Pratincoles laying within a very limited area. Sometimes, but more rarely, the terminal portion of some very long and unfrequented spit of sand is taken possession of, instead of a sandbank island.

The nests are mere holes in the sand, three inches or so across, and an inch or an inch and a half deep. Where the bank is absolutely unfrequented and unvisited, there these holes are scratched in the open without the slightest attempt at concealment; but where boatmen towing boats are passing from time to time, there the birds generally make their nests at the roots of, and partly concealed by, tufts of grass or tamarisk-bushes.

The nests are never lined in any way.

Four is the full number of eggs; but three, and even two, are often found much incubated. So long as there are only two or three in the nest, and the birds have not commenced to sit regularly, they do not seem to care whether you rob it or not; but directly they commence sitting they evince the strongest interest in the matter, and do all they can to entice you away from the eggs.

In the North-West Provinces I have always taken their eggs in March. They are later, however, in the Punjab, and at Thayetmyo Mr. Oates found them beginning to lay on the 12th April. I shall now quote a couple of my old notes in regard to the nidification of this species:—

“ We found a small party of these birds breeding on a low bare sandbank in the Jumna, near Sheregurh (Etawah), on the 12th March. Near it the Skimmer, Large River and Black-bellied Terns also had their nests. Several of the eggs were partly incubated; the nests in which we found these latter contained each three eggs, but the majority had as yet only one or two eggs each, so that I fancy they had not long been breeding. They did not to me appear at all anxious about their eggs, ran and flew off

without uttering a sound when we got near, and only one or two of them, the sitting birds, returned (when we drew off apart to watch them) to look after their nests. Moreover, whilst we were actually collecting their eggs, they were flying about busily hunting flies and other insects, just as if they had no concern with the eggs. Like the Terns, they lay in a little cup-like cavity which they scoop in dry sand. There seems never to be the least trace of any kind of lining, nor any decided attempt at concealment. There were plenty of tiny bushes of jhao (*Tamarix dioica*) and herbs scattered sparsely here and there, but they took no advantage of any of these. I suspect that in the case of these and other birds the warmth generated by the sun on the white sand has a good deal to do with hatching the eggs, and makes up for the irregular way in which the parent birds seem to sit."

Again I have noted:—

"I found an enormous number of the eggs of this species on the 28th April on a sandbank in the Chenab near Wuzeerabad. On the 6th I had examined the same bank and found only one single egg. On the 28th, besides eggs, I found numerous young ones. This species, like the Terns &c., which breed more or less in company with it, lays much later in the Upper Punjab than in the North-West Provinces, but in both places the Swallow-Plover is first to lay.

"Although many of the eggs were placed in tiny depressions in the bare sand, open to the view from all sides, by far the majority were placed at or near the roots of tiny jhao bushes (*Tamarix dioica*), a foot or two only in height and diameter, which partially concealed them.

"Plover-like, four seemed the full number of eggs, but in several cases three, and even two, were found to be much incubated. The birds in no instances sat on their eggs, though one of the pair usually sat near them. I was searching the bank at about 2 P.M., and then the glittering white sands were too hot to allow the hand to be kept on them, while even the boatmen complained that the hardened horny soles of *their* feet were blistered by the heat.

"The strange antics played by these little birds, at least those of them that had young or hard-set eggs, whenever we approached their treasures, were very remarkable: flying past one, they would come fluttering down on to the sand a few paces in front of one, and there gasp and flutter as if mortally wounded, hobbling on with draggled wings and limping legs as one approached them, and altogether simulating entirely helpless and completely crippled birds. No one unacquainted with the habits of this class of birds could have believed, to see them flapping along on the sands on their stomachs, every now and then falling head over heels and lying quite still for an instant, as if altogether exhausted, that this was all a piece of consummate acting intended to divert our attention from their nests. I have seen Peewits and other Plovers behave somewhat similarly, but these little Pratincoles seemed to me to be cleverer performers than any birds I had ever seen.

"On the 9th April I had taken a few fresh eggs of this species off a bank in the Jhelum near Jellalpoor, but the birds at that time showed little anxiety about their eggs, of which we in no case found more than two in any one depression."

Lieut. H. E. Barnes informs us that this Pratincole breeds at Kotri in Sind early in March.

Major Wardlaw Ramsay says:—"The small Pratincoles breed in great numbers on the sandbanks of the Sittang in April and May, just before the rains commence. In the year 1875 the change of the monsoon took place nearly a month before the usual time, and consequently the sandbanks, on which were lying hundreds of eggs of this bird, *S. seena*, *S. melanogastra*, and *Rhynchos albicollis*, were covered with water, and in a few days every egg was swept away."

Referring to the Irrawaddy river, Mr. Oates says of this bird:—"Commences to lay about the middle of April."

The eggs of this species appear to differ very widely from those of the Collared Pratincole. The eggs of this latter are mere of the Plover type, and remind one very strongly of those of the Cream-coloured Courser, whereas those of the present species are, at any rate in the character of their markings, more closely related to those of the Terns in whose company they breed, than to those of any of the Plovers. The eggs are typically broad ovals, pointed at one end; the shell is close, but somewhat chalky in its texture, and entirely devoid of gloss. In the colour of the ground, as in that of the markings, an extraordinary diversity exists. The two commonest ground-colours are pale greenish white and pale fawn-colour; but buff, reddish-brown, pinkish-grey, and white grounds are all common. The markings are of two kinds,—the one which we may call the primary markings are spots, specks, streaky blotches, and hieroglyphic-like lines of various shades of olive and reddish brown; while the secondary markings, which appear to underlie the former, are fainter or brighter purple streaks or clouds. Owing to the comparative predominance of one or other of these two principal forms of markings, and to the diversity in their characters, so many different combinations result that practically it is scarcely possible to pick out two eggs that closely resemble each other, although there is a general sameness in them and an especial character about them which prevents their being mistaken for those of any other species with which I am acquainted.

The eggs vary in length from 0·95 to 1·18, and in breadth from 0·78 to 0·88; but the average of sixty-two eggs is 1·05 by 0·82.

## Family CURSORIIDÆ.

*Cursorius coromandelicus* (Gmel.). *The Indian Courser.*

*Cursorius coromandelicus* (Gm.), *Jerd. B. Ind.* ii, p. 626; *Hume, Rough Draft N. & E.* no. 840.

The Indian Courser breeds commonly in dry, open, more or less bare and moderately watered, tracts throughout Southern, Central, and Central Northern India. Eastwards, in Bengal, Assam, &c., it does not, I believe, breed, and occurs but very rarely; while westward, in Continental India, it is more or less entirely replaced by *C. gallicus*. The latter does not stray much into tracts where the rainfall exceeds 15 inches, whereas our present bird, both north and south, belongs to the 15-to-45 inches zones and plateaux.

I have found the nest twice in June, and once in the last week of March. I believe, however, that the bird lays from March to July. It scrapes a slight hollow in the ground, at times in a bare plain; oftener, I believe, under some tuft of grass or low bush, in stunted, straggling, dry upland jungle, and in it lays two or three eggs on the bare earth; I have never seen any lining nor have I known more than three eggs being found; but my experience has been limited.

Mr. H. Wenden writes:—"A few of the Indian Courser breed about Sholapoor in May and June *chiefly*, but some later on.

"On June 30th, I found a nest of two eggs, hard-set, one with a single fresh egg, and another with three fresh ones.

"On July 4th I saw a batch of three young, and another of two.

"The eggs are deposited on the ground, without the slightest signs of preparation in the shape of a nest, and in the barest and most open plain."

Dr. Jerdon states that "it breeds in a hollow in the ground from March to May, laying usually three eggs of a pale greenish-yellow colour, much blotched and spotted with black and with a few dusky olive spots."

Colonel C. H. T. Marshall remarks:—"There are few more difficult eggs to find than those of this Courser, and unless I had the advantage of going out nesting in March last with that cleverest of all egg-finders, my friend the late Major Cock, I should not, I believe, ever have had the pleasure of taking these eggs.

"The eggs, two in number (at least that is the most we have ever found), are laid on the bare earth where there is no grass. There is no pretension whatever to a nest, not even a depression in the ground; so like are they to their surroundings, that although Major Cock placed Mr. Bingham and myself within three yards of a couple of eggs, we were unable for some little time to make out their whereabouts. The only chance of finding them seems to be to look out for a single bird moving out, as this will be in all probability

a hen that has been disturbed from her eggs (where a pair are seen eggs as a rule will not be found); when she has been spotted, the searcher should sit down at some distance and keep his eye on her through glasses, after a short time she will return and squat over her eggs. This spot should be carefully marked, and after making an alignment he should try and walk straight up to it, never taking his eye off it. The hen bird will always try and deceive him by running sneakingly straight away from the nest; the eye almost invariably follows the bird and the site of the nest is lost, but even with greatest care many will walk up to where they think the eggs are without being able to see them: the only chance then is to retire again to some distance and await the return of the parent bird, which does not as a rule take long, as the bird feels so confident that she has skilfully concealed her eggs from the eye of man, that she comes back in a very short time to them. We found several nests on a plain near the old cantonments of Delhi, at the end of March, most of the eggs being hard-set."

Mr. J. Davidson says:—"This is very common on the bare open parts of Sholapoor, but was rare in Satara.

"It breeds abundantly in April, May, June, July, and August, laying its eggs in the slightest hollow on bare ground; I have never found the eggs (I can hardly say the nest) at all sheltered or near any bush or tuft of grass.

"I do not think Jerdon is correct in stating it usually lays three eggs, as out of nearly twenty nests I have taken, or had brought to me, none have contained more than two eggs."

Colonel Butler tells us:—"Belgaum, 29th April, 1880. I noticed a chick about a week old following the two parent birds on the old Race-course. I galloped up to the spot, and, of course as I expected, saw the two old birds running away alone. However, as the ground was very bare I got down from my horse, and after a careful search discovered the little thing squatting like a stone right out in the open. I took it up in my hand and examined it, and then put it down again, when it raised itself erect just like one of the old birds and ran away across the maidan for at least 100 yards, after which I lost sight of it. It was covered with greyish-buff down much mottled with dark blackish-brown spots."

The eggs of this species seem to average slightly broader and possibly somewhat more brightly coloured than those of *C. gallicus*, but they are in other respects very similar to these. The ground-colour varies from cream-colour to bright buff. The markings are complicated. There are first large clouds, or patches, spots, and blotches, and smears of a very pale inky grey, sometimes occupying nearly the whole surface of the egg, at times only a small portion of this; then above this are lines, scratches, spots, and occasionally streaks of blackish brown or black and a rich olive. These markings are mostly small, niggling, and close-set, with here and there big, clumsy, inky-black smears or smudges intermingled.

Elsewhere I have thus described them:—"The eggs are very sphe-

rical and perfectly glossless. The ground-colour is a yellowish stone-colour or fawnish white, and they are closely mottled, spotted, and in some specimens lined, all over with dull blackish brown and pale inky purple. In some eggs the markings are denser and darker, in some they are comparatively well defined, and in others they are confused and cloudy. These eggs so closely resemble those of *C. gallicus* that it would be difficult to separate them."

In length the eggs vary from 1·14 to 1·26, and in breadth from 0·93 to 1·02; but the average of a dozen is 1·19 by 0·97.

***Cursorius gallicus* (Gm.). *The Cream-coloured Courser.***

*Cursorius gallicus* (Gm.), *Hume, Rough Draft N. & E.* no. 840 bis.

I believe that the first really authentic eggs of the Cream-coloured Courser ever obtained were those procured for me in 1868 by Khan Nizam-ood-deen Khan, the well-known Punjab sportsman, in the neighbourhood of Urneewalla in the western portion of the Sirsa District. I quote the note I published at the time on the subject:—

"When shooting with the Khan in the Sirsa District, I shot a *Cursorius gallicus*. He then told me that there was another species which he described, and of which he some days later procured a specimen, and which proved to be *C. coromandelicus*. He told me that the former bred in the desert portion of the Sirsa District, but that he had never seen the eggs of the latter, which was there a comparatively rare cold-weather visitant.

"I particularly asked him to watch for the eggs of both species and obtain them if possible. In course of time he wrote that he had obtained a pair of birds with one egg, and later that he had obtained two more pairs with two eggs each.

"He sent me the five eggs and the three pairs of birds, all *C. gallicus*; and he certified that in each case he had himself seen one or other of the birds actually on the eggs before touching them, and had himself shot the old bird in each case, which, tame as the birds there are, was a matter of no difficulty. He had procured other similar eggs, but as they had been brought in by others, he could not speak to them for certain and did not send them.

"Now, these eggs could have been laid by no other known bird belonging to the Sirsa avifauna, with which I am well acquainted, except perhaps the *C. coromandelicus*, of which I was equally anxious to obtain eggs, and which are far rarer in Sirsa than *C. gallicus*; and putting this aside, all who know the Khan Sahib will, I know, agree with me that he is absolutely reliable.

"He found all these eggs in July.

"They were in each case laid on the bare ground in a very trifling depression; in one case in a perfectly bare plain, in another in barren ground thinly studded with tufts of coarse withered grass, and in the third in an undulating sandy tract, which might

be called a desert but for numerous bushes of the lana (*Anabasis multiflora*) and the ak (*Calotropis hamiltoni*)."

Since this appeared, the Khan Sahib has taken nearly one hundred eggs of this species, and I have myself visited his domains and taken more than a dozen with my own hands.

The eggs I found placed in situations precisely similar to those in which, in the North-West Provinces, I had found the nests of *C. coromandelicus*. July was the month in which I found them, and it is in this month generally that the great bulk are found; but the Khan has taken them from the middle of March to the middle of August, and the laying-season varies a good deal according to the rains.

The following is an extract from the Khan Sahib's diary for 1870, showing the dates on, and situations in, which he found nests in that year, and the number of eggs in each nest:—

No. of eggs.	Date.	Nature of locality.
2.	14-3-70.	Bajra stubble.
1.	28-4-70.	Under bush close to Urneewalla perao.
1.	8-5-70.	Bajra stubble-field.
2.	13-6-70.	Lemon grass.
3.	19-6-70.	On low sandy land near the Sutlej.
1.	20-6-70.	Waste land.
2.	23-6-70.	Scrub jungle.
2.	26-6-70.	" "
1.	1-7-70.	Clump of grass.
2.	1-7-70.	Low jungle.
1.	3-7-70.	Amongst some oopla in jungle.
2.	5-7-70.	Jungle.
2.	5-7-70.	Jungle.
2.	8-7-70.	Amongst low grass.
2.	8-7-70.	Low jungle.
2.	10-7-70.	" "
2.	13-7-70.	" "
2.	18-7-70.	Cultivated land.
1.	22-7-70.	Open waste land.
1.	22-7-70.	Low jungle.

The nests, he tells me, have always been small hollows, 3 to 5 inches in diameter and at most 2 inches in depth; generally bare, at times with a slight lining of dry grass, which may have been placed there by the bird or may have lodged there accidentally. Three is the greatest number he has yet found in any nest, and this only exceptionally. Two he considers to be the usual complement.

Typically the eggs are very broad ovals, only very slightly compressed towards one end, but here and there somewhat more elongated examples occur. Except that the ground-colour is yellower and more buffy, many of the eggs, both as to shape and

markings, appear perfect miniatures of some of the varieties of *Esacus recurvirostris*. They have, of course, no gloss. The ground-colour is pale buff or creamy stone-colour; and the most characteristic feature in the egg is the huge, dull, half-washed-out inky clouds which underlie the brighter or primary markings, which latter vary from black to olive-brown.

In some eggs the secondary markings cover half or more than half the surface of the egg and are sooty black; in others they are not only smaller but much less conspicuous, being a faint inky purple. Typically the primary markings are very niggling in their character, a combination of specks and spots and fine irregular lines, some black or blackish brown, some olive-brown, thickly sown over the whole surface of the egg. Not unfrequently, however, some few amongst the markings are bolder and coarser, and stand out more or less conspicuously from the general scratchy mottled mass of markings. In some eggs the olive-brown is wholly wanting, and in one egg before me the only representatives of the primary markings are a number of large blotches and spots of a very rich olive-brown. Occasionally the secondary and primary markings are so dense that between them almost every particle of the ground-colour is concealed. Some of the eggs not a little resemble those of *Glareola pratincola* both in size and appearance, but the majority are larger and have smaller and more niggling markings than the eggs that I have seen of *G. pratincola*.

The eggs vary very much in size, from 1.1 to 1.28 in length, and from 0.9 to 1.04 in breadth; but the average of fifty eggs carefully measured is 1.2 by 0.96.

## Family DROMADIDÆ.

### Dromas ardeola, Payk. *The Crab-Plover.*

Dromas ardeola, Payk., *Jerd. B. Ind.* ii, p. 658; *Hume, Rough Draft N. & E.* no. 861.

Despite all that has been urged as to the various affinities of this species, I am quite sure that every ornithologist who has ever watched them in life will agree with me that, so far as habits and manners and customs go, the Crab-Plover is hardly to be separated from *Ælicnemus* and *Æsacus*.

Such being the case, it was natural to conclude that the Crab-Plover would lay two eggs with a brownish or yellowish stone-coloured ground, blotched, streaked, and spotted with blackish brown, and would lay them in some small depression on an open sandbank. Accordingly, when Layard sent an egg extremely like one of *Ælicnemus scolopax* as belonging to this species, I saw no reason to doubt the genuineness of the egg, save that it seemed to me somewhat small for the bird.

Nothing, however, is more certain now than that the Crab-Plover lays *one* and *not* two eggs; that this egg is quite abnormally large for the bird, and pure white in colour; and, lastly, that it lays this egg not in a small depression in the open, but at the extreme end of a burrow running for some four feet into the sand.

These remarkable facts, which naturally again raise the question as to what the real affinities of this species can be, were first set forth by Von Heuglin, and have now been fully confirmed by Colonel E. A. Butler.

Colonel Butler writes:—"I think I am at last in a position to prove that the large white eggs which I sent you last year belong to the Crab-Plover.

"In order that you may be satisfied as to their identity, I will relate fully the circumstances under which they were taken.

"About the 8th June 1878, my friend Mr. Huskisson, Superintendent, Indo-European Telegraph Department, who was then at Bushire, kindly sent some natives to see if there were any sea-birds breeding on one of the islands off Tungistan about 40 miles east of Bushire, Persian Gulf, and they returned with a batch of large white eggs and two skins (a nestling in down and an adult) of *Dromas ardeola*, saying that they had found numbers of these birds breeding on the island, and that the eggs were laid in holes in the sand-hills. The nests they reported as being a good deal scattered, and the eggs as a rule much incubated, many being on the point of hatching.

"On receiving these eggs, I must say I was most incredulous, and thought, as you suggested, that in all probability they belonged to the Gulf Shearwater (*Puffinus persicus*, Hume). However, the skins of the adult and nestling Crab-Plover showed that that species bred there, so I resolved to make arrangements to have the island explored again about May the following year. In the meantime I received another letter from Mr. Huskisson, saying that he had re-visited the island on the 13th July *himself*, and dug out many of the nests which were in holes in the sand-hills, and that most of them contained a single young bird, almost ready to leave the nest.

"The following year, 1879, according to arrangement, my friend Mr. Nash, of the Telegraph Department, visited an island named Montafie, about 20 miles east of Bushire, at the end of May, and made the following report:—"I visited the island off Tungistan, as requested, at the end of May (I was unable to go earlier), with the following result. I secured about three dozen Crab-Plovers' eggs, but could only blow a few of them as they were so hard-set. The eggs are large and white, about the size of a duck's egg. The bird burrows into the sand-hills about 4 feet and in the shape of a bow, the passage being about a foot below the surface of the ground, and the entrance usually near or under tussocks of grass or low shrubs—the egg, which is solitary, being laid on the bare soil at the end of the hole without any sign of a nest.

“There can be no possible doubt about the identity of the bird, as I saw several of them fly out of the nest-holes myself, and they are those peculiar black and white birds with a black swallow-tail mark on the back, a skin of which I sent you from Demarra last year to identify. I have compared the eggs now taken with some of the eggs taken last year, and of which Mr. Huskisson forwarded you a batch, and they correspond exactly, so that you were mistaken in supposing they were Shearwaters' eggs. I saw no Shearwaters anywhere near the island, and do not think they breed about here.

“I went on a donkey along the shore until I got opposite to the island, and then at low tide waded across to it, a distance of about a mile.”

“Later on I received another letter from the same gentleman, in which he says:—

“On the 10th June I visited another island about 40 miles down the coast, named Allah. This is probably the one from which Mr. Huskisson procured you the eggs last year, and in addition to two species of Terns that were then breeding (*Sterna albigena* and *Sterna anæsthetia*), I saw a lot of Crab-Plovers and found numbers of their broken egg-shells.”

“Mr. Nash further observes that the nests were usually ‘all in a heap,’ by which I conclude he means that several nests are built close together.

“Now, however incredible it may appear to ornithologists that the Crab-Plover (*Dromas ardeola*, Payk.) burrows into the ground and lays a single white egg, with the above facts before us resulting from observations made at my request by two utterly disinterested persons two years running, I cannot see how we can arrive at any other conclusion.”

Taken in conjunction with Von Heuglin's account, there can be no earthly doubt that these eggs are those of the Crab-Plovers.

It would seem that they begin to lay at the end of April or very early in May, and that by the middle of July the young have not yet permanently left the nest-holes, but are still always found in these during the *day-time* at any rate. Whether they come out to feed during the night has yet to be discovered. Some old birds once passed within a few yards of me about midnight, and possibly they are partially nocturnal in their habits, and if so, as there are no jackals or other animals on the coral islets where this species breeds, and as there are no birds of prey about in these places at night, it is far from improbable that, though still haunting their burrows during the *day-time* until quite full-grown and able to fly as well as their parents, they may nevertheless come out to feed during the night, as soon as they are able to run well, and this they seem to be within ten days of being hatched.

The eggs of this species are extremely like those of Shearwaters and are large for the size of the bird. They are rather elongated, slightly pyriform ovals; the shell is compact, but very distinctly

granulated ; in colour they are pure white, without any spot or markings of any kind. Held up against the light, the shell is of a pale greenish yellow. Some of the eggs exhibit a very slight gloss.

In size the eggs vary from 2.42 to 2.66 in length, and from 1.73 to 1.85 in breadth ; but the average of twenty is 2.54 by 1.77.

These dimensions are large for the size of the bird. If we compare the following species :—

Name of species.	Average weight of the bird.	AVERAGE DIMENSIONS OF EGGS.	
		Length.	Breadth.
<i>Æsacus recurvirostris</i> ...	1 lb. 12 ozs.	2.15	1.6
“ <i>magnirostris</i> ...	2 lbs. 4 ozs.	2.55	1.75
<i>Ædicnemus scolopax</i> , small Indian race.	0 lb. 12 ozs.	1.9	1.39
<i>Dromas ardeola</i> .....	1 lb. 0 ozs.	2.54	1.6
<i>Hæmatopus ostralegus</i> ...	1 lb. 6 ozs.	2.2	1.6

we see that, though almost the smallest bird of the lot, its eggs are almost the biggest, quite as large as those of *Æ. magnirostris*, which weighs  $2\frac{1}{4}$  times what it does, and *very* much larger than those of *Æ. recurvirostris*, which weighs nearly double what it does.

And, moreover, the eggs do not bear the slightest resemblance, and have nothing absolutely akin, to those of any one of the above-mentioned species, which have usually been considered its nearest allies.

If I was to name any genus, I should say that the eggs and breeding-habits of the Crab-Plovers were closer to those of the Shearwaters than to those of any other with which I am acquainted.

The following additional testimony is furnished by Mr. H. Parker, who, writing of North-west Ceylon, says :—“ *June*. This bird breeds, as Captain Legge supposed, at Adam’s Bridge. I examined part of the sandbanks myself, unsuccessfully, beyond meeting with a few non-breeding birds and a partly-excavated nest-hole, and then sent on an overseer, who has had a special training in oology and collecting, and who is particularly observant and accurate, to complete the examination up to Ramesvaram. He reported the discovery of seventeen nests, all containing young, in a colony on one bank ; but as the particulars noted by him on the spot differ in some respects from other accounts, I reserve them for further verification.”

## Family CEDICNEMIDÆ.

*Œdicnemus scolopax* (S. G. Gmel.). *The Stone-Plover.*

*Œdicnemus crepitans*, Temm., *Jerd. B. Ind.* ii, p. 654.

*Œdicnemus indicus*, *Salvad., Hume, Rough Draft N. & E.* no. 859.

The Stone-Plover breeds in the plains almost throughout India, but only in suitable localities. The country must be dry, and there must be patches of scrub or low jungle, or large groves or dry jheels, pretty thickly studded with grass-tufts. In such situations or in open wastes, or even ploughed fields near to these, the Stone-Plover makes its nest, the site chosen depending a good deal on the season and the period at which they lay. In this latter they are very irregular. The majority no doubt lay in April, but I have taken eggs myself in every month from February to August, both inclusive. Of forty-seven dated eggs before me, the numbers indicated below were taken in each month :—

February.	March.	April.	May.	June.	July.	August.
2	5	26	5	5	2	2

According to my experience in Upper India, *the* place of all others in which they love to breed is some huge old mango-tope in which the trees are not very thick, surrounded by a good high mud-bank, and of which the grass is thickly preserved by some native gentleman for the use of his cattle towards the close of the hot weather, when all other grass has disappeared. In such a grove I once found thirteen nests and saw at least fifty birds, many of which had not apparently yet laid.

The nest is a mere hollow scooped out by the birds, very often in the midst of a layer of dead leaves, generally quite unlined, occasionally with a few blades of grass doing duty as lining. If the nest is out in an open place, it is generally more or less concealed at the base of some bush or tuft of grass; but if a grove, it is very generally not far from some large root of one of the mango-trees in the midst of dead leaves, and these so harmonize with the colours of the eggs that no further concealment is necessary. A dozen times I have passed over, all but treading on eggs thus placed, and which I was eagerly looking for.

Two is the ordinary number of eggs laid, but I have found three in a nest at least half a dozen times. I should guess that in about one in ten nests three eggs occur.

Colonel G. F. L. Marshall writes from the Saharunpoor District :—“ This bird is by no means common everywhere; it is very locally distributed, being plentiful at the foot of the Sewaliks and in the belt of Dhak jungle in the Mozuffernugger District, whilst

in other places scarcely a specimen is to be met with or even heard, for I have often heard without seeing them.

“ It breeds from April to June, laying two eggs of a light nankeen colour, profusely spotted, speckled, blotched, and streaked with deep blackish brown, on the ground, generally on the grass at the foot of, and just under the shelter of, a bush. The eggs are large for the size of the bird, rather lengthened in shape, and more or less pointed at the thin end.

“ The young, unlike others of the Plover tribe, seem very helpless and unable to run till quite fledged. On the 23rd May I noticed one of these birds sneaking away from a low mola-bush on a sandy plain, and on going to look I found a young bird nearly fledged sitting in a slight hollow in the ground, evidently the nest; though able to stand and to walk about, it made no attempt to escape, but permitted itself to be caught at once.

“ On the 13th June I found two eggs on the grass under a keekur bush, a little patch being slightly cleared and a few dead leaves collected. The hen was sitting on the eggs as I rode up, and the cock bird was standing pluming himself a few yards off. On seeing me they both bent down their heads and crept quickly and noiselessly off through the grass to the other side of the bush, but too late to save their eggs, for I had seen the female before she saw me.”

Captain Beavan remarks that this species is “ not uncommon in the uplands of Manbboom, where I found them breeding in April. According to my experience they lay but two eggs, although they may possibly lay three as stated by Dr. Jerdon. I have only observed this species singly or in pairs, never in flocks as described by him.”

Mr. W. Blewitt writes:—“ I took three nests of this species near Hansie during the latter half of the month of April; two of the nests contained two fresh eggs each; the third contained three partly-incubated ones.

“ The eggs were placed in a trifling hollow in the ground scraped by the birds. In one case there were a few blades of dry grass under the eggs; in the others the eggs were laid on the bare ground with a few pebbles arranged as a kind of border around the edge of the hollow.

“ In one case the eggs were laid in the bed of a dry jheel pretty thickly sprinkled with tufts of dry coarse grass; in the others a bare open plain was the situation chosen.”

Major Bingham informs us that this species breeds both at Allahabad and at Delhi in April, May, and June; and Mr. G. Reid, referring to Lucknow, states that he found a nest on the 6th May.

Colonel Butler writes:—“ I found two slightly-incubated eggs of the Stone-Plover near Deesa on the 29th February, 1876, under a low tamarisk-bush in the dried-up bed of a river. I took another nest at Dungarwar, 30 miles N. of Ahmedabad, on the 12th March, 1876, containing two fresh eggs; the eggs were placed under a

euphorbia hedge, in a small hole which had apparently been scratched by the parent bird. The hen was on the nest, but I saw no cock bird near the spot. On re-visiting the place next day, the hen bird was still there, but no cock. When I put the hen bird off the nest she flew for about 20 yards and then settled and commenced running, and continued doing so for about 200 yards, although I was following close behind her.

“Belgaum, 3rd April, 1880. Two eggs about to hatch.”

Mr. Rhodes W. Morgan, writing from South India, says:—“I shot a female of this bird in Kurnool in May, and on dissecting it discovered a fully-developed egg, which I find is different from the eggs of *Œ. crepitans*, as found in Europe. I examined a fine series in Mr. Dresser’s collection, and find that the egg in my collection is entirely different in coloration, being of a dirty-white, with a very few small yellowish-brown blotches. This egg appeared to be perfectly ready for exclusion. It measured 1·8 inch in length by 1·33 in breadth.”

According to Mr. H. Parker, the breeding-season of this bird in North-west Ceylon extends from May to October.

Those who doubt the specific identity of the Indian and English Stone-Plovers would, I think, find their doubts strengthened by a comparison of the eggs of the two species or races. The largest egg of *Œ. indicus* that I have yet obtained is smaller than the smallest of the English specimens that I have seen. In shape the eggs of both races closely resemble each other—normally broad ovals, obtuse at both ends, with the occasional occurrence of a more or less elongated and pointed variety. There is not, however, in the Indian species that rich variety in the ground-colour noticeable in the eggs of the English species. In our bird the ground-colour is invariably yellowish white, buffy yellow, or pale buffy brown. I have never seen specimens such as I have taken in England, with a rich olive-green ground. The markings are, as usual, spots and specks, streaks and blotches, of a deep, usually more or less olive-brown, sometimes almost black, sometimes comparatively pale, thickly or thinly massed or scattered over the surface, and combined in an endless variety of designs. Most of the eggs, besides these primary markings, have a few pale inky-purple clouds and spots underlying them. The eggs, as a rule, are glossless, but I have seen one or two specimens exhibiting a slight gloss. I possess a single abnormal egg taken by Mr. Brooks the ground-colour of which is greenish white, with only a very few brown specks on it.

Of a pair of somewhat similar eggs I have noted:—

“April 18th.—Took two eggs which, had we not seen the bird rise from them close at our feet, no one could possibly have believed to belong to this species. One was pure pale greenish grey, with a few tiny spots, specks, and scratches of brown, so few and inconspicuous as to be unnoticed at the distance of a foot; the other dirty brownish grey, with very numerous specks and hair-like scratches of dirty brown, all so individually inconspicuous as

to make the egg at a little distance appear a nearly uniform, dirty, pale brown. This extraordinary deficiency of colour was *not*, as is commonly the case, accompanied by any dwarfing."

Of another very remarkable egg I have noted:—

"The markings were very large and bold, two gigantic blotches on the broad half, like Asia and Europe, and North America, with a number of contiguous islands. Colour your land black, your seas stone-colour, and a terrestrial globe distorted into the shape of an egg will convey an admirable idea of the markings of this queer specimen."

In length the eggs vary from 1.65 to 2.15, and in breadth from 1.3 to 1.5; but out of forty-seven eggs thirty-nine measure less than 2 inches in length, and the average of the whole number is 1.9 nearly by 1.39.

**Esacus magnirostris** (Geoff. St.-Hil.). *The Australian Stone-Plover.*

**Esacus recurvirostris** (Geoff.), *Hume, Rough Draft N. & E.* no. 858 bis.

The Australian Stone-Plover occurs within our limits, so far as is yet known, only in the Andamans and Cocos, where I last year discovered it. We shot single specimens at both the Great and Little Cocos; at the latter we obtained an egg. We saw the bird, but failed to obtain a specimen at Escape Bay in Macpherson's Straits; subsequently I have received a specimen from Port Cornwallis. The egg we obtained at the Cocos was taken on the 24th March; it was quite fresh, and was placed in a small depression in the coral-sand, a little above high-water mark; both parents, one of which we secured, were standing close to it. Mr. Wood-Mason the year previously obtained an egg, precisely similar to the one we got, and which must have belonged to this species, at Corbyn's Cove, a few miles south of Port Blair. Mr. Mason's egg was obtained on the 15th April.

The eggs closely resemble those of *E. recurvirostris*, but are handsomer and, I think, more elongated. They are large oval eggs, usually I judge a good deal compressed towards one end. The shell is tolerably fine and smooth, but has no gloss. The ground is a creamy stone-colour or very pale *café-au-lait*, boldly blotched, streaked, and spotted with blackish brown, paling in some places to a yellowish or raw sienna-brown. Besides these primary markings, a few small pale inky-purple subsurface-looking spots and clouds are thinly scattered everywhere about the egg. The blackish-brown markings are chiefly confined to the large end. The eggs measure 2.6 by 1.75. The largest egg of *E. recurvirostris* that I have ever obtained, and I have taken a vast number, measured 2.32 by 1.7; the average is 2.15 by 1.6.

Esacus recurvirostris (Cuv.). *The Great Stone-Plover.*

Esacus recurvirostris (Cuv.), *Jerd. B. Ind.* ii, p. 652; *Hume, Rough Draft N. & E.* no. 858.

The Great Stone-Plover breeds throughout India in the beds of all our larger rivers, by preference where banks of sand and shingle, or outcrops of rocks mingled with patches of sand, occur.

I have never found nests elsewhere than in the beds of rivers. Colonel G. F. L. Marshall, whose note I subjoin, has found them in a ploughed field far away from any river. I cannot, however, look upon this as other than a very abnormal and exceptional occurrence. I have found the eggs in the North-West Provinces in March; in the Punjab towards the close of April. Colonel Marshall seems to have found his in June (when *Ellicaeus scolopax* would have been breeding) in the Saharanpoor District. I have certainly seen a hundred nests of this species, and I think I am entitled to conclude that, setting aside abnormal occurrences, they do always breed in Northern India, in the beds of rivers, from March to the middle of May. I quote two out of many notes that I have recorded about the nidification of this species:—

“ We took many eggs of the Great Stone-Plover, on the 12th and 13th March, near Sheregurh on the Jumna. It only lays two eggs, and deposits them in a rather shallow circular depression in the sand. In one instance we found the eggs on the crest of a low bare sandbank on which no other bird was breeding and where there were no rocks near, but in every other case (and we took at least twenty pairs of eggs) they were in and about rocky reefs (here of a kind of compact kunker) entirely surrounded by water, and very often beneath overhanging ledges of rock. In one or two cases they were inside cavities of the rock, but always where there was some little sand on which the eggs rested. Usually two or more pairs of these and of *Hoplopterus ventralis* breed in pretty close contiguity, and one could usually tell there were eggs near, by the way in which the female stood watching our proceedings from a, comparatively speaking, short distance. Of the eggs taken one hatched off in our hands, and some were quite fresh; but these were the minority. The eggs are large and somewhat oval, but vary much in size and somewhat in shape too, some being more pointed than others, but none of them nearly so much so as the Lapwing’s. The ground-colour varies in shade:—in some it is a cold stone-colour; in others a pale olive-brown; in others there is a warmer, perhaps I should say more coffee-coloured, tint. The markings are brown, in some almost black, in others of a burnt-sienna hue: some eggs have a few large bold blotches and a few smaller subsidiary spots and a great portion of the ground unmarked; others are throughout streaked and speckled, leaving nowhere any parts of the ground as big as a pin’s head unmarked; and between these extremes there is every possible variation. All the eggs have a few small secondary markings of a pale dull purplish brown, but these are scarcely visible, except where the primary

markings are comparatively sparse. Both eggs in any nest have generally the same character of marking.

“By 6th April all seem to have hatched off; not one single egg was found between Oodee and Sheregurh. The stomachs of several that I dissected contained the still-undigested claws of crabs.

“I found two pairs of eggs of this species, the one perfectly fresh, the other slightly incubated, on a sandbank in the Chenab, near Wuzeerabad, on the 28th of April, 1870. I saw a good many of these birds early in the month in the Jhelum, but they had not then laid. Usually in the North-West Provinces, wherever these are seen, *Hoplopterus ventralis* are sure to be common, and one finds a dozen eggs of this species to one of the Great Stone-Plover, but neither in the Chenab nor the Jhelum did I notice a single specimen of *H. ventralis*.”

Colonel G. F. L. Marshall writes:—“I found two eggs of this bird on the bare ground in a ploughed field about eight miles from the nearest river, and three-fourths of a mile from the canal, on the 12th June; they were quite fresh, of the ordinary nankeen colour, thickly covered with large blotches of brown. I had two more similar eggs brought me on the 7th June. The bird is by no means common in this (Saharunpoor) district.”

But he subsequently wrote:—“The note given on my authority as to eggs of this bird being found in a ploughed field is erroneous. The eggs belonged to *Ædicnemus scolopax*. I have taken many eggs of *E. recurvirostris*, all were laid on the bare sand on banks of rivers or on islands. They lay from the middle of March to the end of April in the Doab.”

Major Bingham writes:—“Common at Allahabad, where I once found two eggs in a slight hollow on the edge of a ploughed field close to the Ganges, on the 3rd April, 1874.”

Colonel Swinhoe asks:—“Have you any note of the nidification in Sind of *Esacus recurvirostris*? On the Queen’s birthday, when massir-fishing at the Hubb, near Minad Khan’s place, I found one solitary egg lying in the sand in the river-bed; no nest of any kind. The egg is now in the museum here.”

Mr. J. Davidson informs us that he obtained several eggs of this species at Kukurmoonda, in Western Khandesh, in March.

Mr. Oates found a nest in Pegu. He says:—“Nest on May 1st with two fresh eggs in fallow-land.”

Colonel Legge tells us that he found the bird breeding in the Jaffna peninsula, near Pootoor, and at Aripu in Ceylon in March.

Typically the eggs are broad ovals, very slightly pointed towards one end. In this respect they resemble those of the Stone-Plover. The ground-colour varies from pale cream-colour through an earthy drab-colour, which is the commonest, to a somewhat pale olive-brown, and the markings consist of all possible combinations of blotches, streaks, lines, &c., in some cases thickly sown over the whole egg, in others sparsely distributed, of every shade of olive- and umber-brown, in some becoming almost black. Besides these,

many eggs, as in true Plovers, exhibit underlying clouds and spots of faint inky purple. In some eggs the markings are so closely freckled together that the ground-colour is almost entirely hid ; in others they stand out bold and clear, not covering a fourth of the surface of the shell. In some eggs, again, the colour is clear and deep, as if a coat of varnish had been put over it, while in others it is dull and smudgy, as if smeared over with a very thin coat of whitewash. One never finds two nests of eggs of this species closely alike. In size they little exceed those of the Stone-Plover. The eggs are of course devoid of gloss.

In length they vary from 2·0 to 2·32, and in breadth from 1·5 to 1·7 ; but the average of the twenty eggs now before me is 2·15 by 1·6.

## Order LIMICOLÆ.

### Family CHARADRIIDÆ.

*Ægialitis cantiana* (Lath.).\* *The Kentish Plover.*

*Ægialitis cantianus* (Lath.), *Jerd. B. Ind.* ii, p. 640.

*Ægialophilus cantianus* (Lath.), *Hume, Rough Draft N. & E.* no. 848.

Of the nidification of the Kentish Plover in India proper I have no knowledge, but Colonel Vincent Legge records (P. Z. S. 1875, p. 374) finding the eggs of this species (*Ægialitis cantiana*) near Hambantota on the S.E. coast of Ceylon. He writes :—

“ This Sand-Plover, together with *Æ. mongolica* (for the most part in winter dress and not breeding), was the most abundant of the *Charadriinae* met with during my explorations. But before remarking on its nesting, I will describe the habitat of this and other Waders in this part of Ceylon.

“ A chain of shallow lakes or salt-pans, from which the Government of Ceylon annually obtains quantities of salt, fringe the coast in this flat district for many miles to the north of Hambantota ; they are situated at about  $\frac{1}{4}$  of a mile from the sea-shore, being separated from the beach by a narrow belt of jungle through which there is no communication with the outer salt water. The salt-pans (or lēways, as they are termed in Ceylon) are of great extent, many of them being more than ten miles in circumference ;

\* I omit from this Edition the remarks which appeared in the ‘ Rough Draft ’ regarding the breeding of *Charadrius fulvus*, *Ægialitis geoffroyi*, and *Æ. mongolica*, as there is no evidence whatever that any of these species breed within the limits of the Empire. Jerdon’s statement with regard to the first species, that it breeds at Nellore and other parts of the country, is evidently a mistake.—ED

but in the hot weather they become partly dried up (at which time the annual salt 'collections' take place), leaving around them a wide belt of foreshore consisting of a mixture of mud and sand, covered in many parts by tracts of shell-fragments. In places these gravelly shell-wastes are worked into little mounds and hollows by the feet of cattle driven along the shore of the lèways to their feeding-grounds. In these spots I invariably found *Æ. cantiana* nesting. On the top of a little mound 6 inches high there would be a small hollow worked out and bottomed with a number of little shell-fragments, just large enough to contain three eggs. This was the general number of eggs, and was never exceeded; in some I found two, and in others, where the clutch was incomplete, only one. The eggs I procured were not all of the same type, differing both as regards ground-colour and character of marking. As a rule the ground was olive-grey, covered in some instances nearly uniformly with small irregular blots of dark sepia over indistinct spots of bluish grey, with here and there streaks and pencillings of a deeper hue; in others, of the same ground, the markings were most numerous at the obtuse end and the egg covered with longer streaks and scratches. A larger type than this was stone-yellow, with the markings consisting almost entirely of streaked blotches and zigzag pencillings of rich sepia. The largest measured 1·24 inch by 0·91, and the smallest 1·2 by 0·86. My eggs were all taken between the 27th of June and 14th of July, and were in most instances far advanced in incubation, besides which a fair proportion of nestlings were observed, showing the early part of the former month to be the commencement of the breeding-season. All the old birds had already lost the black frontal band, which I had found perfect in birds shot the previous year in the same district as early as the 17th of March, thus reducing the breeding-dress to a duration of only four months."

Colonel Legge subsequently found nests of this Plover near Trincomalie in a dried-up field and at Kanthelai tank on shingly banks, both at the beginning and end of July.

He tells us that the largest egg he procured measured 1·23 inch by 0·91, and the smallest 1·1 by 0·84.

**Ægialitis dubia** (Scop.). *The Lesser Ringed Plover.*

*Ægialitis philippensis* (Scop.), *Jerd. B. Ind.* ii, p. 640.

*Ægialitis fluviatilis* (Bechst.), *Hume, Rough Draft N. & E.* no. 849.

*Ægialitis dubia* (Scop.), *Hume, Cat.* no. 849.

The Lesser Ringed Plover breeds pretty well all over India.

Dr. Jerdon says that "Burgess found them (in the Deccan) breeding in April on sandbanks in the middle of rivers, laying three eggs on the bare sand, of a rich stone-colour, spotted and freckled with grey and brown."

Captain Beavan remarks :—“ *Manbhoom, March.* This Plover scrapes a hole in the sandy bed of a river in which it lays its eggs, making no regular nest.”

Mr. F. R. Blewitt obtained the eggs on sandbanks in the Mahanuddy, near Sumbulpoor, in March and April. We once procured the eggs in the Chumbul in the Etawah District in April. They have been sent me from the Nerbudda, near Hoshungabad, in April. This species also breeds abundantly in the Jhelum in Cashmere, and Mr. Brooks gave me several eggs taken there at Islamabad on the 14th May.

About the nidification there is little to say, it is everywhere the same—a tiny depression scraped, not far from the water’s edge, in sand or very fine shingle, by choice on some water-encircled bank, occasionally on some unfrequented part of the river-bank itself. In this, on the bare sand or pebbles, four eggs are laid.

One of my correspondents writes :—“ On the 7th February, I found one nest of this species on a sandbank in the Ganges, near Allahabad, on which a number of *Sterna seena* were also breeding. The nest was a very shallow cup, placed on a slope of the sandbank, near its centre, and close to a mass of imbedded roots. The nest-hole had a very slight lining of scraps of decayed wood, and was about 3 inches in diameter and 1 in depth, and contained four eggs.

“ The parent birds kept running about tamely in the neighbourhood, but uttered no sound, and did not seem at all put out by the removal of their eggs. After we had removed the eggs, and had retreated to a considerable distance, I watched them with binoculars, slowly, first one, and then the other, sidle up to and inspect the nest ; and after discovering the loss of the eggs, move slowly away, and recommence feeding on the sand.

“ This was the only pair of this species that I met with during the whole day.”

Messrs. Davidson and Wenden, writing of the Deccan, say of this species :—“ Common, and breeds from December to May.”

The eggs of this species are perfect miniatures of those of the Kentish Plover. They are of the usual Plover shape—broad ovals, elongated, and pointed towards one end. The shell is very fine and compact, but there is scarcely any gloss. The ground-colour may be described as a drab, fawn, or buffy stone-colour, or pale *café-au-lait* ; but it is sometimes a pale greenish grey, and the eggs are thinly speckled and spotted or marked with little hieroglyphic-like lines and figures of brownish purple, blackish brown, or black ; while, besides these, secondary markings of a very pale inky purple, which appear to underlie those first described, are scattered here and there, sometimes very sparingly and sometimes pretty thickly, over the whole surface of the egg. Both primary and secondary markings vary a good deal in different specimens in intensity of colour and in density ; but, as a rule, the markings are most numerous towards the large end, where they at times form an imperfect and irregular mottled zone or even cap.

I have the eggs of this species, both from various localities in the plains and from Cashmere; some of those from the latter State are slightly larger, and some of them have the small end more elongated and pinched out than any of those I have from other places.

The eggs vary in length from 1·1 to 1·23, and in breadth from 0·8 to 0·87; but the average of thirty eggs measured is 1·14 by 0·84.

**Ægialitis jerdoni** (Legge). *The Little Indian Ringed Plover.*

*Ægialitis minutus* (Pall.), *Jerd. B. Ind.* ii, p. 641; *Hume, Cat.* no. 850.

The Little Indian Ringed Plover probably breeds over the whole Empire in the same localities as the last, with which it has no doubt been frequently confounded. The only note I can find regarding the breeding of this species is a brief one written by Mr. J. Davidson from Western Khandesh. He says of this bird:—"Permanent resident. Common along all the rivers and along the sides of the Mukhti tank. I took eggs on the Tapti in March and April, and saw young newly hatched near Dhulia in May. The birds, however, breed much earlier, as I have seen them making nests in December and January. This is the only Ringed Plover I found in Khandesh."

Colonel Legge is of opinion that some nests he found in Ceylon belonged to this species, but he was unable to identify them with certainty.

**Lobivanellus indicus** (Bodd.). *The Red-wattled Lapwing.*

*Lobivanellus goensis* (Gm.), *Jerd. B. Ind.* ii, p. 648.

*Lobivanellus indicus* (Bodd.), *Hume, Rough Draft N. & E.* no. 855.

The Red-wattled Lapwing breeds throughout India, except in absolutely desert country, alike in the plains and in the hills up to elevations of 3000 or 4000 feet.

The breeding-season lasts from March to August, and I rather suspect that they have two broods; but I am not sure, for the great bulk of the birds lay in April, May, and June. Out of 122 dated eggs in my collection, I find that the numbers indicated below were found in each of the months specified:—

March.	April.	May.	June.	July.	August.
12	46	24	28	4	8

This does not look like two broods.

They lay almost anywhere, provided there is water somewhere in the neighbourhood. Banks of rivers, edges of swamps or ponds, well-irrigated gardens, are their favourite nesting-sites until the rain falls; after the rains have well commenced they like drier situations. It is very usual then to find their eggs amongst the ballast of a railway (often in such a situation that the foot-

board of every carriage passes over the bird's head), or on the top of a hedge-bank, in an old brick-kiln, or in any well-drained situation; in fact, a pair that had frequented my garden all the cold season at Mynpooree laid on the top of my flat-roofed two-storied house, and hatched their young there, and the second day had the young down in the garden. How they carried them down the forty feet from the parapet of the roof to the ground I could not ascertain. These particular eggs had been kept in their places on the flat roof by a circle of fair-sized pieces of mortar, heavy enough to resist the strong winds which often in Upper India usher in the rainy season. Very generally the eggs are laid in a simple depression in the earth, but not unfrequently the hollow is surrounded by a little circle of stones or a little ridge of sand. I have seen hundreds of nests but never one containing more than four eggs; and though people talk of finding six eggs in a nest, I confess that I "hae mi douts."

I quote here two out of many notes that I have recorded about the nidification of this common bird:—

"On the 13th March we found six nests on the Jumna, two eggs in one nest and four in all the others. The so-called nests were only nearly semi-spherical depressions in the sand (just large enough to hold the four eggs), and were to a certain extent lined with tiny pieces of flood-deposited wood fragments, straw, and grass. It did not seem so much as if the nests were purposely lined with this, as that the birds had chosen to make their nests so as more readily to escape notice on one of the long dark lines of such stuff deposited earlier in the year when the river was higher, and now left some three feet above its level. The nests, as I said, were depressions in the sand, but this sand was not part of a mere open sandbank such as those on which we found the Skimmers', River and Black-bellied Terns' eggs, but some collected round and in amongst a large cluster of hard kunker rocks near Keontra, and, although *near* the southern bank of the river, separated from this by a channel and everywhere surrounded by water. Within fifty yards we found a dozen nests of *Esaeus recurvirostris* and *Hoplopterus ventralis*, and closer still on a spot of level sand running out from the rocks a nest of *Sterna seena*. The eggs of the Red-wattled Lapwing were, some quite fresh, some partly incubated; and they are slightly larger, longer, and more pointed than those of *Hoplopterus ventralis*.

"Going along the line at Etawah for about three miles on 14th August, we found five nests, one containing perfectly fresh eggs. Four of these nests were on the kunker ballast within two feet of the rail, so that the footboard of the carriages of every train must have passed over and within two feet of the sitting bird. The fifth was on the top of the boundary bank, the bird sitting totally unconcerned as our trolley passed within six or eight feet of it, and only moving when I walked up to the spot. Brooks tells me that along his fifty miles of line he has seen at least one hundred nests within the last twenty days or month."

The late Mr. A. Anderson remarked :—" A pair of these Lapwings had taken up their quarters on the flat roof of the Opium Cutcherry at Mynpoorie, and they used to sit on the parapet of the verandah, evidently quite at home, though they certainly looked extremely awkward. Mr. Porcelli promised to get me their eggs from the house-top (for I had no doubt that they were like Mr. Horne's Peewits in this respect); but from all accounts the Crows used to eat them up as quickly as they were laid. It was not till the 11th May of the present year that Mr. Porcelli succeeded in sending me a complete clutch of four eggs: the birds had collected all the little pieces of loose mortar on the roof and made a raised-up nest. About a fortnight afterwards Mr. Porcelli sent me a *second* sitting of the same number; and in June he sent me a *third* batch of *three*, with the following note :—' On this occasion the first egg was laid 9th June; the second, 13th June; and third, 18th June. All eleven eggs are the produce of one pair, for I have never seen more than two birds during the whole time I have lived in this house.'

" March would appear to be the most general month for this Lapwing to lay; but I have no doubt that some of them rear more than one brood in the year, as they lay occasionally all through the autumnal and summer months, and sometimes even during the cold season."

From Sambhur Mr. R. M. Adam writes :—" This species is very common. I have taken its eggs from March till July. The nest is a small hollow in the ground, without any lining; round the edge of the nest a few small stones are placed. A pair nested on the high-water level of the lake near to where salt had to be stored, and I have repeatedly seen the bird sitting on the eggs, although the natives were passing backwards and forwards within a yard of it. The young run about as soon as they are hatched, and when pursued try to make themselves look smaller, if that were possible, by squatting near a stone or piece of earth. The parents are equally frantic with grief and pleasure when they see the young caught and let loose again."

From Jhansi Mr. F. R. Blewitt writes :—" The first four eggs I obtained here were taken on the 17th April, 1868. Their brief history is a melancholy one, for I found them on the *identical* spot where, during the Mutiny, the ladies and gentlemen of Jhansi were cruelly butchered.

" The birds breed well into July. The nest is a simple hole scratched on the surface soil, sometimes bordered with pebbles or gravel, and at other times with loose sand. The regular number of eggs is four.

" I never saw, as Jerdon relates, this bird congregate in 'flocks.' At the beginning of the cold season only I have certainly seen the parent birds and their brood in company, otherwise the birds are almost invariably in pairs or single."

Writing from Kotagherry (Nilghiris), Miss Cockburn says :— " The Red-wattled Lapwings are rather scarce up here, but they

do occasionally breed even higher up than this (5500 feet). During the breeding-season they are exceptionally bold in the defence of their nests, so much so that I have known them attack a person who was taking their eggs, and have seen them drive away a dog which came too near their eggs or young. They also assault jackals when guilty of the same presumption.

"They do not build any nest, but lay their eggs in slight hollows in a concealed spot. They lay from four to six eggs, which are sometimes very difficult to find from their great resemblance in colour to the surrounding objects. They are always placed with the thin ends in the centre of the nest, and are chiefly found in the months of April and May."

Mr. Scrope Doig writes from Sind :—"Took numerous nests from March to end of July; no nest contained more than four eggs."

Colonel Butler records the following note :—"I found a nest of the Red-wattled Lapwing in a river-bed near Deesa on the 9th April, 1876, containing one fresh egg, which I took. The nest was a depression in the sand lined with flood-deposited wood fragments. The old birds attracted my attention by rising from the ground and dashing at every Crow that passed anywhere near the spot, returning when the Crow had passed on each time to the same place. I went and searched, and soon discovered the nest.

"Another nest near the same place on some rocks by the river-side containing one fresh egg, 16th April. Another near Deesa, containing two eggs ready to hatch, April 10th. Another nest in a river-bed near Deesa, 17th April, incubated. A nest in a ploughed field near a tank, on the 24th August, containing three fresh eggs. I fancy this was an exceptionally late nest."

Referring to Afghanistan, Lieut. H. E. Barnes writes :—"The Red-wattled Lapwing is rare owing to the scarcity of water. I have only noted two pairs, and have found but one nest, similar in all respects to those found in India; it contained four eggs, hard-set. This was on the 10th May."

Messrs. Davidson and Wenden, writing of the Deccan, say :—"Common, and breeds from March to August."

Mr. G. Vidal writes from the South Konkan :—"Abundant everywhere, usually in pairs, but sometimes in large flocks. Breeds in bare stubbles on the banks of the rivers in March and April."

Mr. C. J. W. Taylor took eggs in Mysore on the 27th April.

Colonel Legge informs us that this Plover breeds in Ceylon in May, June, and July.

The eggs of this species are of the typical Plover type—normally broad and obtuse at one end and much pointed towards the other. Oval, truncated, and greatly elongated varieties also occur. The ground-colour varies of course as in all Plovers,—in some a clear pale olive-green, in some a yellow, in others a reddish buff, while occasionally it is almost coffee-coloured. The markings are intensely deep brown or black; and there are blotches, streaks,

spots, and clouds thinly or thickly distributed over the whole surface. The endless variety in the colour of the ground, and the extent, intensity, and character of the markings, renders any more exact description impossible; but I may note that, besides the primary markings, most of the eggs exhibit underlying clouds, spots, and streaks of pale inky purple. The eggs have scarcely any gloss.

Taken as a body, the markings of the eggs of this species are bolder and denser than in those of either *L. malabarica* or *H. ventralis*.

In length the eggs vary from 1·45 to 1·85, and in breadth from 1·13 to 1·3; but the average of sixty-four eggs is 1·64 nearly by a little over 1·2.

***Lobivanellus atrinuchalis* (Blyth). *The Burmese Lapwing.***

*Lobivanellus atronuchalis* (Bl.), *Hume, Rough Draft N. & E.* no. 855 bis.

The Burmese Lapwing appears to breed in suitable localities throughout British Burma from Thayetmyo on the north to the Pak-Chan estuary on the south.

Mr. Davison, writing to me from the Tenasserim Provinces, remarks:—"A few miles from Ye-boo, while passing over a plain covered with stunted bushes, and odd clumps of elephant-grass partially burnt (for there had evidently been a jungle fire there some eight or ten days previously), I noticed several pairs of *Lobivanellus atrinuchalis*, which, as we approached, rose with their well-known cry of 'Dick! Did you do it?' but settled peaceably again after we had passed on a short distance; but one bird, instead of behaving like the others, kept running hither and thither, evidently very reluctant to take wing. I of course at once began to look about for a nest, making the men scatter and do the same; the bird did not at all approve of this, and became more and more distressed. It was not long before one of my men found the nest, if it can be so called, containing one egg, quite fresh. The egg was placed in a slight depression in the ground, but there was no pretence of any nest, not even a few bits of dry grass. This was on the 10th of March."

Mr. Oates writes from Pegu:—"My eggs of this species have been taken between the 15th April and 15th May. After the latter date few eggs are to be found.

"They are placed on the ground in grass or paddy-land on the bare soil, a few bits of hard clay disposed round the cavity marking the limits of the nest.

"The number of eggs is generally four. Ground-colour, *café-au-lait*, thickly blotched, streaked, and spotted with deep blackish brown; surface marks and paler shell ones. The marks are thickest at the broad end, where they often form a cap, but never a ring. Average of thirteen eggs, 1·64 by 1·17."

The eggs are not, I think, separable from those of the Indian representative race either as regards size or markings.

**Lobipluvia malabarica** (Bodd.). *The Yellow-wattled Lapwing.*

*Sarciophorus bilobus* (Gm.), *Jerd. B. Ind.* ii, p. 649.

*Lobipluvia malabarica* (Bodd.), *Hume, Rough Draft N. & E.* no. 856.

The Yellow-wattled Lapwing breeds throughout the plains of India in dry uplands. I have usually found the eggs in waste plains, known in Upper India as 'Oosur maidans,' rarely in ploughed lands, never on sandbanks or in the close vicinity of rivers or tanks. The bird is in India at all times a bird of the dry uplands, like the Stone-Plover, and has none of the affection for damp or wet localities that so strongly characterizes most of our Plovers.

According to my experience it lays in April and May. All the nests I have found were met with in these months. Mr. Brooks found a nest in Chunar in May and in Etawah in April. Sir E. Buck got a nest in April in Cawnpore, Mr. F. R. Blewitt in Raipoor in May, and I have not yet heard of anyone getting a nest at any other time of the year, but still I think it very possible that our bird *may* lay earlier and later.

On one or two occasions I have found the eggs overshadowed and more or less hidden by tufts of grass, but usually the nest is out in the open without any attempt at concealment.

The nest is a small circular depression scooped out by the bird and entirely unlined, some 3 or 4 inches in diameter and an inch in depth, and often with a little earth or a number of tiny pieces of kunker scraped up against the margin all round, so as to deepen the cup.

The eggs are always four in number.

Colonel G. F. L. Marshall writes:—"All the eggs that I have taken of this species were found in ploughed fields. I have not found many, for the bird is rare and the eggs very hard to see. On the 26th of April, near Cawnpore, I found four eggs laid on a ridge in a small ploughed field surrounded by 'usar.' I had the greatest difficulty in finding them, walking three times carefully over the field, and twice marking down the female bird from a short distance as she seated herself on them. She accompanied me throughout the search, and returned to the eggs before my eyes when I retired baffled, though they were quite fresh. The male bird was feeding a couple of hundred yards away."

The late Major Cock wrote to me:—"This is a very common bird in certain parts of Oudh near Seetapore, and more of its eggs could I think be taken there than of *Lobivanellus indicus*. It breeds in July; and on any piece of rough ground, if you observe the bird walking about, the eggs may be quickly found by moving

off to a distance, sitting down and watching the bird with glasses. The eggs vary from two to three, placed in similar situations to the eggs of *L. indicus*; no nest to speak of, a small depression, the soil slightly broken up round the nest; eggs often plastered with dried mud, but this I take it from the bird sitting on them with muddy shanks in the rainy weather."

Colonel Butler says:—"Belgaum, 29th April. I found a nest containing four eggs about to hatch on a perfectly bare maidan. It consisted of a shallow saucer-like depression in the ground, with a slight embankment round it formed by the earth that had been scratched out, and with one or two stalks of dry grass at the bottom of it, which may have come there by accident or may have been placed there by the old birds as a lining.

"The old bird sat very close, allowing me to ride up to within a yard of her without moving, and when she did leave the nest, which was not until after I had remained staring at her for some seconds, she did not take wing but raised herself slowly off the eggs and walked away.

"On the 1st of May I got another nest at Belgaum, containing four incubated eggs."

Messrs. Davidson and Wenden, writing of the Deccan, say:—"Common; breeding from May to July."

Mr. J. Davidson remarks that in Western Khandesh he obtained the eggs of this Plover both in the rains and in the cold weather; and Mr. C. J. W. Taylor took the eggs in Mysore on the 17th of May.

Colonel W. V. Legge, writing from Ceylon, remarks of this Plover, that "it breeds in June and July, nesting on open ground near the shores of lagoons, salt lakes, &c." He says, "I have found its nest near the sandy shores of the salt-pans of Hambantota; it consisted of a hollow, stamped in the sandy ground, without any lining whatever; it was about a hundred yards from the edge of the water, and contained four pyriform eggs, less contracted at the smaller end than those of our Lapwing at home, and of a rich stone-yellow ground-colour, blotched evenly all over with three shades of sepia, the darkest blots being the largest; beneath these were spots of faded bluish grey. Axis, 1.48; diameter, 1.14."

The eggs of this species are in shape of the true Plover type. The ground-colour is buffy or pale greenish or olive stone-colour, and they are pretty thickly studded with spots, streaks, and moderate-sized blotches of deep brown, interspersed with spots and streaks of pale olive-brown and dingy inky purple. The eggs are of course devoid of gloss. They are markedly smaller, more neatly marked, paler and yellower, as a body, than the eggs of *L. indicus* or *H. ventralis*.

In length they vary from 1.35 to 1.57, and in breadth from 1.02 to 1.1; but the average of twenty-two eggs is 1.45 by 1.07 nearly.

**Hoplopterus ventralis (Wagl.). The Spur-winged Plover.**

*Hoplopterus ventralis (Wagl.)*, *Jerd. B. Ind.* ii, p. 650; *Hume, Rough Draft N. & E.* no. 857.

The Spur-winged Plover breeds on the banks and in the beds of most of the larger rivers of India and Burma, penetrating the hills to elevations of 1500 to 2000 feet. It does not, so far as my experience goes, occur in the Indus or its affluents.

Never at any season is it seen away from running water; it is absolutely constant to streams and rivers, preferring those localities in which there is a little shingle or rock, and for breeding-purposes selecting, of all others, rocky promontories or islands in which the rocks are interspersed with soft cushions of sand.

I have only found their eggs in March and early in April. The following note, recorded many years ago in the Etawah District, gives pretty well all I know about their nidification. I have seen many hundreds of their nests, but have nothing, I fear, to add to what I noted when I first came across them:—

“On the 12th and 13th March, 1867, we took a great number of the eggs of these birds, all in nests of four, the nests being nearly semispherical depressions in sand, just big enough to hold the eggs, in and about clusters of kunker rocks in the River Jumna just below Sheregurh. Occasionally the depression contained a few little pieces of old water-borne straw or rush, but often was quite bare. We never found any in open sandbanks, such as the Terns seem to prefer, nor in rocks not surrounded on all sides by water. The kind of places they affect are those frequented by *Esacus recurvirostris*, and often the nests of the two birds are within a few yards of each other. We did not, however, notice any nests concealed under overhanging ledges of kunker, whereas the *Esacus* often lays its eggs in such places. The ground-colour of the eggs varies considerably. The most common colour is pale stone-brown, at times more or less tinged with olive, and occasionally with a faint pinkish shade. Commonly they are profusely spotted with moderate-sized very dark brown blotches and with numerous secondary, quasi-below-the-surface, pale purplish-brown blotches; but at times they have only a few very large dark brown blotches, and just a few very small ones, with more or less of the secondary markings. Sometimes most of the primary markings are collected in a dense zone near the larger end. The normal type of the egg is very pointed, but some are much less so than others. I notice that all the four eggs of any nest have invariably the same character of markings.

“By the 6th April almost all have hatched off, and the young are seen scampering about. Only two nests with eggs were found between Oodee and Sheregurh, and both were ready to hatch off.”

Colonel G. F. L. Marshall writes:—“I may add to Mr. Hume’s remarks on this species, which in the main are fully borne out by my experience, that in the Cawnpore district I found them breeding

on open sandy islands, even in company with the Terns ; and in the north of the Saharanpoor district I twice found the eggs laid on shingle on the banks of the Jumna."

The late Mr. A. Anderson says :—" The Indian Spur-winged Plover invariably lays on the beach of large rivers (never *high* banks), or in sandy islands, in close proximity to the water's edge ; and, according to my experience, is never found *inland*,—thus differing very materially, both in its habits and nidification, from its more common ally, *Lobivanellus indicus*. As in the case of Lapwings generally, the eggs are four in number, and are placed with the pointed ends inwards, in a slight hollow made for their reception.

" I have generally found the eggs placed on the bare soil, or (in Bundlecund) amongst shingle and pebbles ; but my friend, W. Bryson, has furnished me with the following anecdote in reference to a deviation from the general rule :—' This nest I had great difficulty in finding, as the birds had taken possession of a ready-made depression in a melon-field, where the seed had apparently failed ; and they had actually lined the hollow, first with small chips of drift-wood, and then with pieces of dry moonj grass, with which the cultivators were enclosing their melon-fields into square patches to prevent the sand drifting over the creeping-plants. The bird (which proved to be a female on dissection) returned to the nest immediately after I had removed the eggs, and so great was her disappointment that she scattered all the materials with her feet, occasionally picking up the straws with her bill, and tossing them away with violent jerks of her head.'

" On one occasion I found the eggs of this bird within a few inches of the water, in an angle of a half-burnt charpoy ; the charred wood, clothes, and skull were lying close to it.

" The eggs are slightly smaller, *perhaps* more pyriform, and the ground-colour is much greener than is usually the case with those of *Lobivanellus indicus* ; still I have one clutch of the latter, taken by myself, which is not distinguishable from the usual run of the eggs of *Hoplopterus ventralis*."

The eggs very closely resemble those of *L. indicus*, and after the remarks above quoted no separate description of them is necessary ; all that can be said is that, as a body, the eggs of this species are somewhat smaller, and their markings smaller and less bold than those of *L. indicus*.

In length they vary from 1.42 to 1.78, and in breadth from 1.12 to 1.3 ; but the average of fifty is 1.58 by 1.18.

## Family SCOLOPACIDÆ.

**Scolopax rusticula**, Linn. *The Woodcock.*

*Scolopax rusticola*, Linn., *Jerd. B. Ind.* ii, p. 670; *Hume, Cat.* no. 867.

My friend, the late Mr. A. Anderson, found the eggs of the Woodcock on the Himalayas. The following is his account: he wrote:—

“On the 30th of June I turned my face towards the snows in another direction, determined to consider my expedition a failure so long as the discovery of the breeding-habits of the Woodcock still remained a desideratum, which was one of the chief objects of my expedition. After two days' stiff marching I pitched camp at a place called Kemo, at an elevation of some 10,000 feet, over and against Namick, which is celebrated for its salt-springs.

“Here my luck culminated; and I have probably to thank my fellow-traveller, Dr. Triphook (an ardent sportsman, and quite game to fag all day with his rifle or my collecting-gun as the case might require), for not only the most beautiful clutch of Woodcock's eggs I have ever seen, but the first that have as yet been taken in this country.

“We were following up a huge wounded *Presbytis schistaceus* (I was anxious to compare it with the Central-Indian form) through a dense undergrowth of Ringalls, when a Woodcock rose close to us, dropping again almost immediately, and disappearing in the cover. A diligent search revealed the long-looked-for prize, four eggs, which were deposited in a slight depression in the damp soil, and embedded amongst a lot of wet leaves, the *thin ends* pointing inwards and downwards into the ground.

“The eggs found (I could see they were hard-set), I told Triphook I had no intention of leaving the place without bagging the bird. It was raining heavily and bitterly cold, with the thermometer down to 40°; but, fortunately for us, before we had had time to make ourselves comfortable under an adjoining tree, the bird flew back in a sort of semicircle, alighted, and ran on to her nest. No sooner down than she was off again, frightened, as I subsequently learnt, at one of our dogs, but which at first thought alarmed me not a little, as I imagined she was removing her eggs. After having satisfied myself that my suspicions were unfounded, it was decided that, as I had done my duty in finding the nest, shooting the bird should devolve on Triphook, and right well he did it, considering all the disadvantages which militate against having a snap shot in dense cover and in a thick mist. I never do anything but miss on such critical occasions; at any rate I would rather some one else make a *mull* of it than myself!

“The eggs, as before mentioned, are a most beautiful set; in

consequence of the advanced state of incubation, it was a full month before they were made into good specimens ; a week later and the chicks would have been hatched. They are far *darker* and *redder* than the usual run of Woodcocks' eggs, all four resembling the *second* figure in Hewitson's work, and in the character of their markings they are not *unlike richly* coloured specimens of some Tern's eggs. They are remarkable for the roundness of their form, and in having none of the pyriform or pear-shaped character which distinguishes the eggs of all allied species."

**Gallinago nemoricola**, Hodgs. *The Wood-Snipe.*

*Gallinago nemoricola*, Hodgs., *Jerd. B. Ind.* ii, p. 672 ; *Hume, Cat. no. 868.*

The late Mr. Mandelli's men found four clutches of eggs of this Snipe in June in Native Sikkim, opposite Darjeeling, at an elevation of about 11,000 feet.

The eggs of this species strongly recall some varieties of those of the Common Snipe and of *Gallinago major*. In shape they are broad, almost hemispherical in the larger half, and abruptly compressed from the middle and pointed towards the small end. The shell is stout but compact, and has a decided though faint gloss. The ground is a pale stone-colour, and about the larger end they are densely and boldly blotched, the blotches mostly longitudinal in their character, and radiating in curved lines from the broad apex of the egg, with a rich brownish maroon, almost black in some spots, the blotching being intermingled with very similar-shaped, subsurface-looking pale, inky-purple patches and clouds. In one egg the markings are almost entirely confined to the upper third of the egg, where they are all but in places quite confluent. In the other the markings, though somewhat less densely set, extend over the whole upper half of the egg ; very few markings, and these much reduced in size, extend in either to the lower half of the egg.

Ten eggs vary from 1.66 to 1.75 in length and from 1.21 to 1.28 in breadth \*.

**Rhynchæa capensis** (Linn.). *The Painted Snipe.*

*Rhynchæa bengalensis* (Linn.), *Jerd. B. Ind.* ii, p. 677 ; *Hume, Rough Draft N. & E.* no. 873.

I have only once myself taken a nest of the Painted Snipe, and that was at the end of August, in a small swamp on the Diamond Harbour Road about six miles from Calcutta. It was on very wet ground in the midst of low rushes, and consisted of half-dry rush twisted round into a tolerably neat and compact nest. It measured 6 inches in diameter exteriorly and less than 4 inches interiorly,

\* *G. caelestis*, the Common Snipe, probably breeds in Cashmere, as noticed in the 'Rough Draft,' but its eggs have not yet been taken there. *G. solitaria*, the Solitary Snipe, apparently also breeds in Cashmere.—ED.

and the cavity, which had no lining, was a good inch in depth. It contained two quite fresh eggs.

A nest of this species, sent me by Mr. A. J. Rainey, is a large circular pad of mingled coarse and fine rice-straw, some 6 inches in diameter and about 1·75 in thickness, and with a central depression perhaps  $\frac{3}{4}$  inch in depth. It was taken on the 22nd September 1871 at Khalispoor, about  $1\frac{1}{2}$  mile from Khoolna in Jessore, on rather wet ground in a bare field from which a crop of rice had been reaped about a month before. This year (1874) Mr. Rainey took two eggs (which he very kindly sent me) from a similarly situated and very similar nest, on the 30th September at Khoolna, and this time correctly identified the parents.

Colonel G. F. L. Marshall took the eggs, of which I still have two, in the Saharunpoor District, but could not at the time ascertain what bird they belonged to. Captain Sheppard obtained a nest with four eggs in September in Raipoor.

Major M. Forbes Coussmaker, writing from Chamrajnugger (35 miles south-east of Mysore and 40 miles north of the Nilgiris), informs me that he has satisfied himself that this species breeds in his neighbourhood during December.

Dr. Jerdon states that "the Painted Snipe is a permanent resident in some parts of India, breeding in June and July in thick marshy ground, and laying four eggs, which are greenish, with large brown blotches, and very large for the size of the bird."

Mr. Scrope Doig found nests of this Snipe in the Eastern Narra in May, June, and July; and Colonel Butler found many at Milana near Deesa in August and September.

Colonel Legge, writing from Ceylon, says of the Painted Snipe:—"This species, which is resident in this island (although I have no doubt its numbers are very much increased in the cool season), appears to breed at all times of the year.

"To commence with the evidence of our pioneer, Layard says:—"The season of incubation is from May to July." That it breeds at or about this season is, I know from personal observation and inquiry, quite correct. The late Mr. Advocate Lorenz (a much lamented member of the Ceylon bar), who took a great interest in birds, wrote me shortly before his death that he had once found a nest with young in the month of April in the Western Province. It was situated in the grass of a bank between two paddy-fields. Again, a friend of mine observed a pair of old birds in company with two young near a tank in the south of Ceylon. This was in May 1872. On his giving chase, the chicks took to the water and swam like ducklings. In the beginning of September last year, I had several young brought to me from Wackweell, near Galle, a locality where I have found them more abundant than anywhere else in Ceylon. These data corroborate Layard's statement, but they testify at the same time to a wider period, commencing a month earlier and ending a month later. With regard to the cool season, I am aware of eggs having been taken perfect from birds in

November, and of young being captured in March. Mr. Holdsworth procured a beautiful egg from a wounded bird on the 31st December, and I obtained another taken from a dead bird on the 29th March."

From Tonghoo, Major Wardlaw Ramsay writes :—" On the 14th September, 1874, I extracted a perfect egg from a female that I had shot. This seems a late date for the bird to be breeding."

Reviewing the evidence now available, I should say broadly that the majority bred once during the height of the rains and once during the middle of the cold season ; but practically, in one place or another, this species has been found breeding in almost every month in the year ; and while I have no doubt that they have two broods a year, I think it possible that, under favourable conditions, they may have more.

The eggs are almost invariably four in number.

The eggs of this species are of a truly Scolopacinine type—moderately broad ovals, with one end, as it were, pulled out and pinched near the extremity. They are, however, remarkably small for the size of the bird, considering the natural order to which this belongs.

The Painted Snipe probably weighs three times as much as the Jack Snipe, while the cubic contents of the egg of the former are scarcely four-fifths of those of the eggs of the latter. In colour and markings the egg has a somewhat Plover-like appearance. The shell, very hard and of a close and compact texture, has commonly a faint gloss. The ground-colour is a clear pale buff or warm *café-au-lait*, thickly and boldly blotched and streaked with an intensely deep and rich brown, which at a little distance appears perfectly black, but which here and there pales to a raw sienna-brown. The markings often cover considerably more than half the surface of the egg.

In length they vary from 1.29 to 1.49, and in breadth from 0.89 to 1.05 ; but the average of forty eggs is 1.4 by 0.99.

**Tringoides hypoleucus (Linn.). *The Common Sandpiper.***

*Actitis hypoleucus (Linn.)*, *Jerd. B. Ind.* ii, p. 699.

*Tringoides hypoleucus (Linn.)*, *Hume, Rough Draft N. & E.* no. 893.

Within our limits, I only know for certain of the Common Sandpiper breeding in Cashmere. There in May on the banks of the Sindh and other rivers its nests are common. Mr. Brooks and the late Major Cock found many, and I have received them since from native collectors.

It appears that they usually lay their eggs close to the water in a little depression in the shingle or coarse sand without making any nest, but that sometimes a lining of grass or dead leaves is placed in the hollow. Usually the nests are in no way concealed, but at times they are partially hidden under a bush, tuft of grass, or rock. This is my native informant's account ; I have seen no nest myself.

Major Cock remarks :—“I found the Common Sandpiper breeding plentifully on the banks of all the streams that run into the Cashmere Valley, and took many nests on the Sindh River in May and June.

“The nest is placed a few yards from the water in an open situation in stony localities amongst low sage-bushes. It is on the ground in a slight depression, generally to the north of a low bush, and consists of a few little pieces of stick or a few fragments of dead leaves. It always contains four eggs, the pointed ends of which are placed together in the centre. The bird gets off the nest very slowly, as if it wished to attract attention to itself.”

Mr. Scrope Doig records the finding of a nest of this Sandpiper in the Eastern Narra, Sind, on the 3rd July. The nest was found by one of his men, and perhaps some doubts may be entertained about its authenticity.

The eggs are always four in number.

The eggs of this species are typically ovato-pyriform in shape, hemispheres united to somewhat elongated truncated cones, which latter are again often a good deal compressed or pinched in towards the tips. Many eggs, however, are merely somewhat elongated ovals, broad at one end and elongated and pointed towards the other. The shells are very fine and close, and have a certain amount of gloss.

The ground-colour varies a little, but the most usual type is a pale creamy stone-colour, with a buffy, *café-au-lait*, or sometimes even pink tinge. The markings are a rich red-brown, in some cases so intense as to be all but black, and consist of specks and spots more or less intermingled with, and underlaid by, spots and small clouds of reddish, or in other cases pale inky, purple. The eggs do not vary very much. The markings are never very dense, except at the large end, where they sometimes form an almost confluent cap, but individual eggs differ in having them *comparatively* dense and sparse. The markings, never bold or large, vary from mere specks to spots nearly an eighth of an inch in diameter; this also imparts a somewhat different character to different eggs. On the whole, however, a series of the eggs of the Common Sandpiper is more uniform than any series of most other well-coloured and marked eggs would be.

In length they vary from 1.35 to 1.52, and in breadth from 1.0 to 1.11; but the average of fourteen eggs is 1.46 by 1.06.

### Himantopus candidus, Bonn. *The Stilt.*

Himantopus candidus, Bonn., *Jerd. B. Ind.* ii, p. 704.

Himantopus intermedius, Blyth, *Hume, Rough Draft N. & E.* no. 898.

The only places in Upper India where I have seen the Stilt breeding are in and about clusters of salt-works situated in the Goorgaon District, about thirty-five miles south of Delhi, known collectively as the Sultanpoor Works.

Mr. Adam has found quite young birds at the Sambhur Lake, and some few pairs probably breed there; and Captain Feilden mentions that in June 1867 some twenty pairs bred at a jheel near the village of Toomulgoodium, about thirty miles from Secunderabad on the Masulipatam Road; but, with these exceptions, not only I, but nearly fifty other oologists scattered over the length and breadth of the Empire, have for years sought in vain for the breeding-haunts of the Stilt.

The merit of discovering Sultanpoor as a central breeding-haunt is due to Baboo Kalee Narayn, the Customs patrol in charge of the works. He assured me, when I first visited them in the winter, that the Stilt did breed there in summer, and he correctly pointed out, as the result of his observations, that the eggs, though greatly resembling those of the Red-wattled Plover, which also breeds there abundantly, can be distinguished from these by—1st, the nest, the Plover never making any; 2nd, the size of the egg, which is slightly smaller, and the shape, which is more attenuated at one end; and 3rd, by the markings, which are less numerous and more clearly defined.

I specially note this, because neither before nor since have I ever met any Hindoo gentleman who, of his own accord and unprompted by Europeans, had taken heed of such details of natural history. That summer he collected some eggs for me, and next year I visited the place; and it may give some idea of the numbers that resort to these works to breed if I mention that between the 26th April and the 29th May he had actually collected two hundred and thirty-five eggs, and that on my visit I counted in two days over one hundred eggs, without going over one-tenth portion of their laying-sites.

The birds are seen in small numbers throughout the year, but congregate in great numbers towards the middle of April about the works, which consist of brine-wells and many hundred acres of shallow, rectangular, evaporating-pans from 100 to 200 feet square and from 6 to 10 inches deep. These pans are merely depressions dug in the soil and lined with *chunam* or fine lime obtained by burning *kunker*, a nodular concretionary limestone found in beds near the surface more or less throughout the plains of Upper India. Small strips of ground from a foot to five or six feet broad divide the pans, and on the margins of these, or even in the beds of disused pans, where only a little brine ever stands, the Stilts build their nests.

They collect together small pieces of *kunker*, or the broken lime-lining of the pans, into a circular platform from seven to even twelve inches in diameter and from two to three inches in height; on this again they place a little dry grass, on which they usually lay four eggs, but not unfrequently only two or three. They begin to lay, according to season, towards the end of April or the beginning of May; and by the beginning of June numbers of young are to be seen about, and by the 1st July most of the eggs that remain are hard-set. The majority of the birds lay during June, earlier or later according to season.

The temperature of the nest at this time in the full sun probably averages quite 140° Fahrenheit.

The birds have their choice of sites, though on what this depends I could not find out. Not one nest was found in two successive seasons at Balpoor or Kuliawas; very few at Sultanpoor. On the other hand, at Moobarikpoor (and all the works are exact *facsimiles* one of the other) the nests were in some places crowded to an inconceivable degree. On one strip, about 3 feet wide and 100 feet long, there were twenty-seven nests on one margin and eleven on the other, besides five nests of the Red-wattled Lapwing. So accustomed were the birds to the workmen walking up and down the middle of this strip that many of the birds never moved, though we passed within a few inches of them, and those that did move merely stalked leisurely a few paces away into the salt-pans on either side.

Major C. T. Bingham says:—"I visited the breeding-place of this bird at the Sooltanpoor salt-works in May and June last year (1875). The birds were breeding simply in hundreds."

Colonel Legge writes from Ceylon:—"Great numbers of these birds were breeding at Minery and Kandelay tanks this year. At the latter place I found many fresh eggs as late as the 4th of August; many others were hard-set, but no young were, up to that time, to be found. In the south I have found young as early as the end of June. The spot chosen to breed in, at Kandelay, is an island in the tank; the ground is partly shingly and partly overlaid with soil, rock cropping out in one or two places. I found the nests in all situations and very variously constructed; some were holes scooped in the ground and lined with large gravel only; some constructed amidst lumps of flood-deposit; some scraped in the ground and scantily lined with small twigs and grass-stalks; others made in depressions in rock and built entirely of little sticks and other matter taken from the 'flood-wreck.' The eggs were mostly four in number, though many nests contained three hard-set; they were for the most part *not* placed point to point, and varied immensely in size and ground-colour. . . . When its breeding-grounds are approached the Stilt is very clamorous, flying towards the intruder and passing to and fro over his head, with loud harsh cries, but when the vicinity of its nest is reached, it usually retires and alights at some little distance, allowing its nest to be rifled without further manifestation."

The eggs of this species are in shape and general appearance very Lapwing-like, reminding one much of the eggs of *Lobivanellus indicus*. They are, however, as a rule smaller, more pointed, and with less numerous, but more clearly defined, markings. In shape they are moderately broad ovals, elongated, and in some pinched out as it were towards one end, reminding one of eggs of the Red-shank. The texture is very fine and compact, and the eggs have many of them a certain amount of gloss entirely wanting in the Red-wattled Lapwings' eggs. The ground-colour appears to vary as in the Plovers'. In some it is a darker or paler olive-brown; in

others a greenish stone-colour; in others pale cream-colour or pale *café-au-lait*. The markings consist of specks, spots, blotches, and streaks irregularly sprinkled over the whole surface of the egg, but most thickly so, as a rule, towards the large end. The markings are black, blackish brown, and rich umber-brown. As a rule, the markings are all clearly defined, and are all of much the same colour. The secondary markings of pale inky purple, so characteristic of most of the Lapwings' eggs, are normally almost entirely wanting in those of the Stilts.

In length the eggs vary from 1.5 to 1.8, and in breadth from 1.1 to 1.32; but the average of sixty-four eggs taken at random out of over three hundred and carefully measured was 1.64 by 1.21.

### Family PARRIDÆ.

**Metopidius indicus** (Lath.). *The Bronze-winged Jacana.*

Metopidius indicus (Lath.), *Jerd. B. Ind.* ii, p. 708; *Hume, Rough Draft N. & E.* no. 900.

Dr. Jerdon tells us that the Bronze-winged Jacana is found throughout India; but as a matter of fact it is almost absolutely confined to the moister portions of the country, and is very rarely if ever seen in the drier portions of the North-West Provinces, in the Punjab, Rajpootana, and Sindh. In the moister districts of Oudh, the sub-Himalayan Teras of Rohilkund and Goruckpoor, through the greater part of Bengal and Burma, it is very common, and here, as also in the better-watered portions of the Central Provinces and the Peninsula of India generally, it breeds from June to September.

It never ascends the hills, so far as I have ascertained, and never frequents rivers, but affects exclusively large, more or less rush-grown and lotus- or weed-paved, jheels or swamps.

The nest, generally a large one, composed of rushes and water-weeds twisted round and round, so as to form a circular pad, from 10 to 20 inches in diameter, with a central depression 2 or 3 inches in depth, is commonly placed here in Bengal (where alone I have myself taken it) on a bed of lotus-leaves in some secluded rush-surrounded corner; one nest, however, was on a piece of swampy ground in the midst of a clump of thick rushes, surrounded on all sides by the water of the jheel.

Of six nests none contained more than seven eggs, but the boatmen averred that the birds, sometimes at any rate, laid ten.

Mr. W. Theobald makes the following remarks on the nidification of this bird in Monghyr:—

“Lays in August. Eggs, long ovato-pyriform. Size, 1.50 by

0·97. Colour, clear brownish-ochre, strongly lined and streaked with black. Nests, of weeds in jheels."

Mr. Robert Blewitt says:—"I found this species, though not in numbers, in the jheels and marshes of the Lullutpoor, Saugor, and Nursingpoor Districts and the Valley of the Nerbudda. It was pretty common between Jubbulpoor and Raipoor, and in this latter country of swamps and tanks it is abundant. It breeds from June to about the middle of September. The nest is made of weeds roughly put together. This nest, of various sizes from a foot to nearly two feet in diameter, is often made on the water surface, at others on any island near to the water's edge. In each situation a sheltered spot is chosen, offering concealment; among thick-growing lotus-leaves is a favourite resort.

"The regular number of eggs I have not been able to ascertain accurately, but from 8 to 10 may be taken as the maximum number. In colour they are sometimes of a light olive-brown; at others of a darker brown, streaked and marked with black.

"This Jacana runs with wonderful facility over the floating weeds, lotus-leaves, &c. It is a rather shy bird, and when alarmed will conceal itself by lying close on the weeds or plants, with its head and neck well stretched out on a level with the body. When it can do so, for more effectual concealment it will half-sink its body in the water. The bird is likewise an expert diver. The boatmen on the Talbeehut Lake (Lullutpoor) told me that the birds moult once in each year, just before the rains in April and May."

Colonel Butler writes:—"I found a nest of the Bronze-winged Jacana at Milana, 18 miles E. of Deesa, on the 25th August, 1876, containing three slightly incubated eggs. At first the eggs looked as if they were resting simply upon the surface of the water, but upon closer inspection it turned out that they were supported by a considerable quantity of aquatic weeds collected together under the water. The nest was built amongst a quantity of lotus plants, one of the large leaves of which completely overshadowed it. On the 12th September I searched the tank again, and found another nest built by the same pair of birds, containing four fresh eggs. The nest in this instance was exactly the same as the first, but raised rather higher in the water, and in a much more exposed situation."

Mr. H. Wenden remarks:—"At Callian, 32 miles from Bombay, this bird breeds freely on the numerous rushy tanks, in which, as they are all adjacent to and more or less connected with a tidal river, the level of the water is liable to sudden and considerable increase. A flood occurred early in September, by which I believe the first set of nests were swamped, and this may doubtless account for the fact that no nest observed by me contained more than four eggs; nor did nests which had hatched out show more shell than would suffice to form that number. I note this, as I observe that Mr. R. Blewitt states that this species lays as many as eight or ten eggs."

"On 11th September I went to a tank on which, a week before,

we had observed several nests, and we found them all swamped. On another tank, however, I found two eggs and several half-finished nests.

"On 19th September I took four nests and on 3rd October four more. On 26th October, observed a nest with four eggs. On 3rd November it was in same state. Five days later it was found hatched out and the chicks gone.

"On 21st November, whilst snipe-shooting, I met a man with three young of this species, two of them half-grown and one a tiny thing of two or three days.

"In my searches after these nests, I noticed a peculiar fact, that the Bronze-winged and Pheasant-tailed Jacanas never bred on the same tank if it was small; and if the tank was large or long, the ends or sides were appropriated by different species.

"I may add that I often found nests floating on water which was 8 feet deep."

Mr. Oates writes from Pegu :—"I procured a nest with four eggs on the 6th of August."

The eggs of this species are amongst the handsomest I have ever seen.

In shape the eggs are moderately broad ovals a good deal pointed towards one end, and, especially when fresh, have the most superb lustre of any egg I know; indeed, it is often difficult to convince people who see them for the first time that they are not made of agate, or, when they feel them for themselves, fancy imitations made in the lacquer-work in which the natives of some parts of India so greatly excel. This extraordinarily high polish grows somewhat less bright after the eggs have been kept some time, but even when years have passed away they still remain the glossiest of our Indian eggs.

The ground-colour varies much: in some it is a very pale stone-brown, in others a rich *café-au-lait* colour; in others again a reddish olive-brown, and in some a very deep rufous or at times olive-brown. The markings are chiefly blackish brown, at times all but black, and here and there paling to a deep reddish brown, and they consist almost exclusively of lines, finer or coarser, intertwined and entangled, as it were, one with the other in inextricable confusion. Here and there a few spots and even blotches are noticeable, but the general character of the markings is as above described.

In length the eggs vary from 1·3 to 1·55, and in breadth from 0·96 to 1·08; but the average of fifty-eight eggs is 1·47 by 1·03.

### *Hydrophasianus chirurgus* (Scop.). *The Pheasant-tailed Jacana.*

*Hydrophasianus chirurgus* (Scop.), *Jerd. B. Ind.* ii, p. 709; *Hume, Rough Draft N. & E.* no. 901.

The Pheasant-tailed Jacana, unlike the preceding species, is really found all over India, ascending the hills to some extent and breeding freely, for instance, in the lakes in Cashmere. Long since I described the nidification of this species, and I have nothing further to add to what I then said, which I now quote:—

"They lay from the middle of June to August. The nest (placed in any pond, jheel, or swamp, just as often on the outskirts of some village or small town as in amongst fields or jungle) is often a mass of weeds and rushes heaped together in the water in the midst of the thickest grass and rice, and so low that the eggs are half-immersed in water. Occasionally the nests are amongst the grass of some little island, and then they are much slighter. At times, even when constructed in the water, they are so small as hardly to be able to contain the eggs—little, shallow, circular cups of rush and water-weed, on floating lotus-leaves or tufts of water-grass. Dr. Jerdon tells us they lay from four to seven eggs; they *may* in Southern India, but I do not believe it, and in Northern India they *do not*. Out of hundreds of nests that I have seen, I only once found one containing even five eggs. Four is the almost invariable number, laid point to point. The apical angle is too great to allow of six or seven being thus laid. You might as well try to get seven right angles into the centre of a circle.

"The eggs of this species really seem to indicate that it is not so closely allied to the Rails and *Parridae* as is generally supposed. How very different are the eggs of its nearest apparent Indian ally, *Metopidius indicus*, with which we have just dealt, and which lays, Water-hen like, from eight to ten moderately broad oval eggs, a good deal pointed towards one end, but still manifestly intended to lay anyhow in the nest, and not point to point like a Plover's or a Redshank's.

"If *H. chirurgus* and *M. indicus* are so very nearly allied as all systematists seem to consider them, is it not extraordinary that their eggs should differ so absolutely in shape, texture, colour, markings, number, and manner of disposition in the nest, and that the former should have a distinct winter plumage while the latter has none? The two skeletons require careful comparison. I should be inclined to suspect that these two species are derived from very different stocks, although a similarity of external conditions may have led to a similar superficial modification of external forms."

From Saugor Mr. F. R. Blewitt writes:—"This Jacana breeds here from the middle of June to August. I found two nests—one a floating one, made of grass and weeds, the other on a small island similarly made. The nests were more than a foot in diameter. I am not certain as to the maximum number of eggs. The largest number I found was four. Breadth, 1·12. In colour they are of a fine greenish bronze throughout."

Colonel G. F. L. Marshall remarks:—"I have taken eggs of this species in Bolundshahr and Cawnpore in July, on the 30th in the former, and on the 8th, 16th, and 27th in the latter. The bird comes in with the rains; the nest is made in water, about two feet deep, by collecting together a few of the floating weeds, and a few more pulled up by the roots, making a slight sunken platform just sufficient to float the eggs which are deposited on them; there is no attempt at concealment, and the eggs, which are of a deep bronze colour, are visible from the bank."

Dr. Jerdon says :—" It makes a large floating nest of dried pieces of grass and herbage, sometimes, according to some accounts, of the stalks of growing rice, which it bends downwards and intertwines ; and it lays in July or August from four to seven eggs, sometimes more, of a fine bronze brown or green."

Major Bingham writes :—" While wading out to the nest of a Sarus Crane near Allahabad I came on the semi-floating nest of this bird. It was made of a few decayed rushes and laid on the top of some lotus-leaves, containing three eggs."

Mr. Scrope Doig, writing from the E. Narra, Sind, says :—" Found numerous nests all through August ; no nest contained more than four eggs, which seemed to be the normal number."

Colonel Butler remarks :—" I found any number of eggs of the Pheasant-tailed Jacana at Milana, 18 miles E. of Deesa, in August and September this year (1876), from the 21st of the former month to the 20th of the latter. The nests contained either three or four eggs, except in one instance, when there were two only."

" The nest of this species is exactly like the nest of *M. indicus*, consisting of a mass of aquatic weeds collected together under the water, the tops of the nest being either on a level with the water or raised slightly above the surface, but placed as a rule in more exposed situations. The eggs vary a good deal in size and colour. One type exhibits every shade of rich olive-brown, and another every shade of rich olive-green. One egg I possess, which I took out of a nest containing three other fresh eggs of the olive-brown type, is pale sea-green all over. I have never seen another Jacana's egg like it. I have an egg taken at Tanna in October 1875. It is a perfect pegtop and of a greenish-bronze colour. The eggs as a rule are highly glossed, but some are dull at the large end."

Mr. H. Wenden says :—" Many nests observed at Callian between 29th August and 29th October. No nest contained more than four eggs."

And this gentleman and Mr. Davidson, writing of the Deccan, remark :—" Sparingly observed. Believed to breed."

In the north-west of Ceylon, according to Colonel Legge, this Jacana breeds in March and April.

In shape the eggs of this species are so peculiar that once seen they can never be mistaken. They may be described as pegtops without the pegs—cones slightly obtuse at the point, based upon somewhat flattened hemispheres. In texture the shell is compact and hard, and, especially when fresh, has a fine gloss. The colour varies a good deal ; when quite fresh they are of a rich deep bronze colour, sometimes a greenish and sometimes a more rufous bronze colour ; but as incubation proceeds, they very commonly, though not always, bleach somewhat under the long-continued influence of sun and water, and grow paler and paler until they become a pale yellowish stone, or in other cases pale *café-au-lait* colour.

In length the eggs vary from 1.26 to 1.62, and in breadth from 1.03 to 1.18 ; but the average of fifty eggs is 1.46 by 1.12.

## Order GRALLÆ.

## Family PTEROCLIDÆ.

*Pterocles exustus*, Temm. *The Common Sand-Grouse.*

*Pterocles exustus*, Temm., *Jerd. B. Ind.* ii, p. 502; *Hume, Rough Draft N. & E.* no. 802.

The Common Sand-Grouse breeds throughout the drier and barer portions of the more or less sandy plains of the continent of India. Rocks and hills, forests and swamps, it equally eschews, and the haunts it best loves, and where its nests may be found in greatest numbers, are scattered fallow or stubble, or newly-ploughed fields, dotted about on and surrounded by large semi-desert plains. As to the breeding-season I hardly know what to say. I have found their eggs almost every month of the year in one place or another, but in the North-West Provinces the majority probably lay from April to June.

Further west and north, where the rainfall is very scanty, they must, I think, have two or more broods in the year.

Khan Nizam-oo-deen, Khan Bahadoor, the well-known Punjab sportsman, who has collected for me for so many years, always kept up a register, showing from day to day the various birds and eggs obtained, the localities in which found, &c., and this he always sent me with each batch of skins and eggs.

From his registers for 1869 and 1870 I find that he took nests of this present species on the subjoined dates in each year: this was at Urneewalla, some fifteen miles east of Fazilka in the Sirsa District.

	1869.	1870.
January .....	.....	.....
February ...	.....	3rd, 24th.
March .....	.....	1st, 4th, 12th, 21st.
April .....	.....	21st, 22nd, 27th, 28th.
May.....	8th, 25th.	1st, 3rd, 5th, 7th, 15th, 28th.
June .....	16th, 17th, 30th.	11th, 15th, 21st, 30th.
July.....	1st, 2nd, 5th, 10th, 11th, 12th.	23rd.
August .....	.....	.....
September ...	1st, 2nd, 3rd, 7th, 10th.	.....
October .....	.....	3rd, 22nd.
November ..	.....	24th.
December ...	.....	7th, 20th.

In some cases three nests were found in a single day. During these two years he sent me so many eggs that I begged him to collect no more, and so after 1870 these eggs are never mentioned.

To quote an abstract I made of his register for 1869 :—“ In no case did he find more than three eggs in one nest. In one instance he obtained five eggs in one spot—three in one place and two about 3 inches distant ; but he ascertained that these belonged to two different pairs. Fully half of these eggs were found in fallow fields ; the rest in bare waste-land or desert-like sand. In only two cases were the eggs found in any way sheltered or hidden in the roots or tufts of grass. In every case the eggs were laid in a slight depression on the bare ground. No nest of any kind was met with.”

This has also been my own experience, except that I have not *at all* unfrequently found the eggs more or less sheltered by low bushes, tufts of grass, or large clods.

Mr. William Blewitt says :—“ On the 9th March, in a field near Bhatoul in the Hissar District, I found a nest of this species containing *five* (!) almost fully incubated eggs. They were, as usual, placed on the bare ground in a shallow basin scratched out by the birds, some 5 inches in diameter and 2 inches in depth. They all belonged, I believe, to one pair, but in no other instance did I ever meet with more than three eggs in any nest.”

I may note here that the Khan Sahib reported that although he had never been able to meet with such a nest, the villagers, where the birds were very common, said that they occasionally saw four eggs in one nest-hole.

From the Sambhur Lake Mr. R. M. Adam writes :—“ The Common Sand-Grouse is found here throughout the year in great numbers. It breeds here, and I have taken the nests in April and May.

“ I have seen a nest here at the root of a tuft of sarpot grass, the leaves of which protected the bird from the sun’s rays. The nest had a lining of loose pieces of grass, and contained three eggs.”

This is another instance of the variable habits of this species. I must have taken at least thirty nests, the Khan Sahib fully double that number, and neither of us ever saw any sort of lining to the nest-hole ; and yet not only Mr. Adam but other good observers have vouched for finding more or less of a grass lining on many occasions.

The late Major Cock told me that “ the Common Sand-Grouse lays its eggs in a hollow amid loose stones (I speak of the environs of Nowshera) in the months of May and June, usually on barren arid ground, the heat of which is terrible at that time of the year. I have frequently found the eggs with their albumen semi-coagulated from the heat, and I fancy that if the bird left its eggs for any time during the heat of the day they would be baked !

“ They lay three eggs, blunt at both ends. There is no nest to speak of, only a bit of stick or two.”

The late Mr. A. Anderson remarked :—“ The Common Sand-Grouse breeds throughout the Doab in March, April, and May (and no doubt later on), laying the orthodox number of *three* eggs, and

never four, as stated by Jerdon. As a rule, there is no attempt at anything like a nest, the eggs being deposited in a slight depression on the bare ground, scraped out by the birds most frequently in an extensive plain.

"At times they lay only a pair of eggs. On the 2nd March, 1873, when roaming over a plain covered for miles with *reh*, which gave the ground the appearance of being carpeted with crisp snow, I flushed a Sand-Grouse which flew *perpendicularly* out of sight. Looking down, I found a pair of eggs, which were laid *parallel* to each other, in a slight hollow, sparingly lined with dry grass-stems. My camp being close to this place, I amused myself in watching the birds incubating, feeding round about their nests, and dusting themselves after the fashion of fowls. On the 4th (there being still only two) I removed the eggs, shooting the sitting bird, which proved to be the male. As I approached the nest, the bird glided off, and skulked away in a crouching posture, so as to avoid detection, and then squatted.

"On the 19th October last my friend Mr. Hastings took a clutch of eggs at Etawah which he sent to me; these eggs were either unusually late or early as the case may be."

Colonel Butler writes:—"I found a nest of the Common Sand-Grouse at Dungarwar (55 miles S. of Deesa) on the 13th March, 1876. It consisted of a slight depression in the ground scratched by the old bird on a perfectly bare sandy plain and without any lining. I found nests near Deesa on the following dates (1876):—

" March 30th.	A nest containing 2 fresh eggs.		
May 6th.	"	"	2 fresh eggs.
" 7th.	"	"	2 incubated eggs.
" 18th.	"	"	3 slightly incubated eggs.
" 20th.	"	"	1 fresh egg.
"	"	"	2 fresh eggs.

"Many of the above nests were on bare ground; others in grass beerhs, sometimes in the open, at other times under a tussock of grass. I took many other nests during the hot weather, but did not record the dates."

He adds the following brief note:—"Belgaum District, 9th February, 1880, three fresh eggs; 18th February, one fresh egg."

Mr. Scrope Doig collected eggs of this Sand-Grouse in the E. Narra, Sind, in April.

Mr. J. Davidson tells us that he has taken eggs of this species at Nandurbar in Western Khandesh in February; and this gentleman and Mr. Wenden further tell us that in the Deccan this bird is "very common, and appears to breed at all seasons."

The eggs are of a very peculiar shape, long and cylindrical like those of a Nightjar. The texture is fine and smooth, and they have generally a fine gloss. Not only in shape, but in markings also do many of them strongly resemble those of some species of Nightjar. The ground-colour varies much; in some it is a pale, somewhat pinkish stone-colour, in others greyish or dingy greenish

white; in some pale *café-au-lait*, in others a somewhat light olive-brown. Typically they are thickly spotted, streaked, or irregularly blotched, pretty uniformly over the whole surface, with two sets of markings—the one of darker or lighter shades of olive-brown, the other a sort of pale inky purple, and these latter, which are most commonly streaks and clouds, seem to underlie the others. Different eggs vary much in the distribution, size, and intensity of these markings, as also in the relative proportion of the extent of surface covered respectively with what I may call the primary and secondary markings: in some almost the whole ground-colour not occupied by the primary markings is clouded with the pale inky purple, in others only here and there a few spots of this colour are traceable; in some all the markings are small, very thickly set, and freckly, in others they are bold, large, eccentrically-shaped blotches, comparatively thinly distributed over the surface. Some of the eggs are, as a whole, very much darker-coloured than others, and in some the ground-colour might perhaps be best described as a faintly greenish grey. As a rule, the paler the ground the paler the markings and *vice versa*. Exceptionally beautifully marbled eggs are met with, as also unmottled pale creamy varieties. I have never, however, seen one that could be mistaken for an egg of *P. fasciatus*.

The eggs vary in length from 1.32 to 1.6, and in breadth from 0.95 to 1.11; but the average of seventy eggs is 1.45 by 1.03.

**Pterocles fasciatus (Scop.). *The Painted Sand-Grouse.***

*Pterocles fasciatus (Scop.)*, *Jerd. B. Ind.* ii, p. 498; *Hume, Rough Draft N. & E.* no. 800.

The Painted Sand-Grouse belongs especially to the low ranges of rocky and more or less barren hills that are scattered about the continent of India, and I have never observed them more than a few miles or so away from the base of these. Throughout the so-called Mewât Hills and the Aravallis which run down from Delhi to Mount Aboo, a broad straggling broken belt of stony, detached, and often barrow-like hills, they are common. In the low bare hills of the North-west Punjab, about the barer parts of the Sewaliks, and on the stony ridges and (during part of the year) the forests of the Central Provinces, they are tolerably abundant, and in all these localities they are permanent residents and, to the best of my belief, breed.

Most of the numerous eggs that I have received have been found in April and May, but the nearly allied *P. exustus* breeds so irregularly and at such different periods that it is very probable that the breeding-season of the present species also varies much and is not by any means confined to these two months; indeed, Mr. R. Thompson took a nest near Chandah on the 28th November; and again Colonel Butler, of Her Majesty's 83rd Regiment, writing from Mount Aboo, remarks:—"I shot a pair of Painted Sand-Grouse,

with three young ones not quite full-grown, in the plains below, about twenty miles from this, in February last, which shows that *P. fasciatus* breeds in this neighbourhood in the cold weather, as these young birds must have been hatched, I should say from their appearance, during the previous month."

They make no nest but merely scrape a slight depression in the soil (occasionally, it is said, thickly lined with grass), at some spot more or less overhung or sheltered by a tuft of grass or a low bush, and lay as a rule three, but not uncommonly only two, eggs.

Mr. R. M. Adam says:—"This very beautiful bird is common about all the low ranges of hills near the Sambhur Lake, and doubtless throughout the Aravallis. Sometimes it is met with under the shade of the 'tor' (*Euphorbia royleana*), about halfway up the hills, but as a rule small parties are generally flushed at or near the base of the hills where the ground is mostly stony.

"My first nest was found on the 3rd April. I have since obtained fresh eggs in May. The nest, I was told, was simply a hollow scraped in the ground, with a number of small pieces of stone round the edge and some loose grass for a lining.

"The number of eggs in each nest varied from two to three, but in one nest four were found. When fresh, the eggs vary from a deep to very pale salmon-colour, but when blown the colour changes in a few days to a rich cream-colour, and all are pretty uniformly spotted and speckled with light lavender and rusty. They are of a blunt oval form, and measure in length 1·4 and in breadth nearly an inch."

Writing from Chandah (Central Provinces), Mr. R. Thompson says:—"I send you two eggs of *Pterocles fasciatus*, which I took on the 28th November in the Mohurli Forests.

"The nest contained three eggs, of which one unfortunately got broken. It was placed on the ground on a slight rise; neatly and well put together, saucer-like, made of dried grass, bits of dried leaves of bamboo and other plants. The soil was sandy, with a thin forest growing on it, and the nest was placed under the shade of a small tree. There was no cover in the immediate vicinity of the nest; in fact, for three or four yards all round there was nothing but thin short grass. I accidentally arrived at the spot, and whilst talking to a friend the female bird got up close at our feet, and I saw the nest immediately after."

Mr. J. Davidson, writing of Western Khandesh, says of this bird:—"Probably breeds at all seasons, as I have taken eggs in November, January, March, and May."

And this gentleman and Mr. H. Wenden, writing of the Deccan, say:—"Numerous in various suitable localities, but not commonly distributed. Breeds in March."

Mr. E. C. Nunn sent me the first eggs of this species that I ever saw, from Hoshungabad. The eggs were of the usual long cylindrical Sand-Grouse type, but the coloration resembles that of several of our Indian Nightjars, and but for the careful extraction of the young chick, which accompanied the eggs in spirit,

I might have believed them to belong to some large species of Nightjar.

The eggs are very regular, obtuse-ended, cylindrical ellipsoids, the shell very smooth and glossy, the ground-colour a delicate pale salmon-pink, with a good many, somewhat widely scattered specks and tiny streaks of brownish red in all the eggs, much more numerous towards one or other end, and with a good many small pale inky-purple spots and clouds, almost exclusively confined to that end where the markings are most numerous.

Specimens are occasionally met with in which the markings are very sparse, and I have one specimen in which they are absolutely and entirely wanting. Not unfrequently the markings form a pretty perfect zone towards one end, and here and there an egg is met with exhibiting six or eight large deep brownish-red blotches. Pale pinky white, white, and somewhat buffy stone-colour grounds are also met with.

In length the eggs vary from 1.3 to 1.62, and in breadth from 0.93 to 1.05; but the average of forty eggs is 1.42 by 0.98 \*.

*Pterocles senegalus* (Linn.). *The Spotted Sand-Grouse.*

*Pterocles senegalus* (Linn.), Hume, Cat. no. 801 bis.

A single egg of this species I owe to Mr. William T. Blanford, who extracted it from the body of a female which he shot on the 20th March, 1875, in the desert west of Shikarpoor, Upper Sindh. In shape and size the egg is similar to that of *P. exustus*, but the markings are much more sparse than in any egg of that species that I have ever seen. The egg is of course cylindro-ovoidal, the ground-colour is a pale yellowish stone-colour, and the markings, which are thinly distributed over the surface of the egg, consist of olive-brown spots and tiny blotches with a few crooked and hooked lines; besides these, a few pale lilac-purplish or inky-grey spots, streaks, and smears having a subsurface appearance are scattered irregularly about the surface of the egg.

Having been extracted from the body of the bird the egg has of course but little gloss. It measures 1.5 by 1.05.

\* Lieut. H. E. Barnes records the following notes on the nests of two species of Sand-Grouse he found in Afghanistan. He writes from Chaman:—

*PTEROCLES ARENARIUS* (Pall.).

"The Large Sand-Grouse is very common. I found them breeding in May. The eggs, three in number, are, as regards shape and colour, exact counterparts of those of *Pterocles exustus*, but are of course much larger. They average 1.8 by 1.35."

*PTEROCLES CORONATUS*, Licht.

"The Coronetted Sand-Grouse is not very common. I have only seen a single pair, which I shot, and from a spot where I flushed them I found three eggs, so hard-set as to be unfit for specimens. They measured 1.5 by 1.06."

## Family TURNICIDÆ.

*Turnix taigoor* (Sykes). *The Bustard-Quail* \*.

*Turnix taigoor* (Sykes), *Jerd. B. Ind.* ii, p. 595.

*Turnix ocellatus* (Scop.), *Jerd. tom. cit.* p. 597.

*Turnix pugnax*, *Temm.*, *Hume, Rough Draft N. & E.* no. 832.

*Turnix plumbipes*, *Hodgs.*, *Hume, tom. cit.* no. 833.

The present species, the Bustard-Quail, breeds pretty well all over India and Burma, where there is forest and jungle accompanied with long grass. In the wooded districts of the Central Provinces, in Oudh, and Bengal, in the sub-montane districts of the North-West Provinces and the Punjab it is common; while in the more open and indifferently wooded and watered parts of the North-West Provinces, the Punjab, Rajpootana, and Sindh it breeds only as a straggler when it does make its appearance, arriving during the rains and leaving early in the cold season.

This bird is confined to the outer and lower ranges of the Himalayas (in which they rarely ascend, even in summer, to any elevation above 6000 feet) and the valleys that skirt their bases.

Dr. Jerdon says:—"The eggs are said to be usually deposited under a bush or in a slight, well-concealed hollow. They are from five to eight in number, and of a dull stone-grey or green colour, thickly spotted and freckled with dusky, very large for the bird and very blunt. In the Carnatic this bird breeds from July to September, further south from June to August, and in Ceylon, says Layard, from February to August. The females are said by the natives to desert their eggs and to associate together in flocks, and the males are said to be employed in hatching the eggs; but I can neither confirm nor reject this from my own observations."

It may lay twice a year, but I have always found the eggs in July and August and at no other time. Sometimes it makes no nest at all, and merely scratches a hollow at the base of, or in the midst of, some tuft of sirpatta grass, or occasionally some little dense bush adjoining or surrounded by long grass. Sometimes it makes a little pad of grass, rather soft dry grass, 3 or at most 4 inches in diameter and  $\frac{1}{2}$  inch in thickness, which it places as a lining to the hollow.

I have always found four eggs, and, notwithstanding what Dr. Jerdon says, I have seen so many nests, at least six during the past month (July), in the Botanical Gardens, Calcutta, that I am quite certain this is the normal number. Mr. C. J. W. Taylor, however, records finding seven hard-set eggs in one nest in Mysore.

Mr. A. G. Theobald writes:—"I found a nest at Ahtoor, the hill-station of the Shevaroys, on the 20th August. It was a bare

\* I propose to follow Mr. Ogilvie-Grant in uniting the Bustard-Quails of India and treating them as one species.

circular hollow scraped out at the base of a thick shrub, and had absolutely no lining. The eggs, four in number, were laid on the bare earth. I send the eggs."

Mr. W. Theobald makes the following remarks on the nidification of this species in Monghyr:—"Lays in the first week of June. Eggs, four in number, round pyriform. Size, 0·88 by 0·74. Colour, yellowish grey, closely freckled with dark yellowish grey, blotched with deep reddish umber, with a few dots of neutral. On ground."

Captain Hutton remarks:—"On the 30th July the eggs were taken in the Dhoon near the foot of the mountains. Colour, stone-grey, irrorated with small specks of brown interspersed with larger spots of neutral tint, which form an irregular ring at the larger end. They measured rather less than an inch by 0·75. The number of eggs was four only, but the proper number, according to Jerdon, far exceeds this. There was no nest, but merely the usual scratched spot on the ground, with a little dry grass and leaves, beneath a few stunted bushes. The bird ascends in the summer to about 5500 feet and breeds there also. It has a pleasing ringing note, and is brought in large numbers for sale. It is very pugnacious, but is easily tamed."

From Sikhim Mr. Gammie writes:—"I have found this bird breeding in May and June in the Darjeeling District from 2000 to 4000 feet. It builds on the ground in open, cleared, country, by the sides of small shrubs or tufts of low grass. It sits very close and can easily be caught on the nest. The nest is usually, though not always, hooded, loosely made of dry, half-rotten grass, and measures externally about 4 inches in height, to the top of the hood, by the same in width. The cavity is about 2 $\frac{3}{4}$  inches in diameter and an inch in depth from lip of cup. The eggs are four in number, and the young leave the nest directly they are hatched. The bird is common in the tea and cinchona plantations, and (in wet weather especially) greatly frequents the roads, only rising when almost stepped on. It is a source of great annoyance to timid ponies, rising as it does with a whir from under their noses. It is a very solitary bird, rarely more than one being seen at a time. I am not certain that it is migratory, but cannot recollect ever observing it during the cold season."

Mr. J. Davidson informs us that in Western Khandesh this bird is a permanent resident. A few pairs bred round Dhulia in the rains.

Colonel Butler writes:—"Belgaum, 15th Sept. 1880, a nest containing 4 fresh eggs. In the same locality, nests were found as follows:—

" Sept. 22nd, 1880.	2 fresh eggs.
" 25th, "	3 fresh eggs.
" " "	3 incubated eggs.
" " "	3 incubated eggs.
" 26th, "	3 fresh eggs.
" " "	3 fresh eggs."

And he found nests near Deesa from the 28th July to the 9th August.

Mr. Iver Macpherson tells us that on the 30th June he found a nest of this bird with four eggs near Chanda, C. P. "The nest, which was at the foot of a small clump of bamboos, was, I think, rather a remarkable one for this bird. It was the usual little pad in a small hollow in the ground, but in addition had a little hood over it made of fine grass. The nest seemed to me to be a perfectly new one, and not an old one of some other bird used for the occasion."

Mr. J. Inglis, writing from Cachar, says:—"The Bustard-Quail is plentiful during the rains in grass lands. It breeds in June, making a very shallow cavity for its nest. It lays four or five eggs of a brownish-grey colour."

Mr. J. R. Cripps, writing of this species in Assam, remarks:—"Of four nests only one was domed; the rest were pads of grass and twigs with no lining. The latest nest found was on the 31st August, with two slightly incubated eggs. Four is the general number of eggs in each nest. In some gardens they are more plentiful than in others, but, strange to say, they are never found away from the tea-cultivation. An old resident of Assam told me this, and so far my observations confirm it."

In Ceylon this species or the closely allied *T. pugnax*, Temm., according to Colonel Legge, breeds from February to May, and most likely has another brood later in the year.

Mr. Oates found the nest in Pegu with four eggs on the 10th August in bush-jungle.

In shape the eggs vary from moderately broad ovals, scarcely at all pointed towards the small end, to typical pegtops. The ground-colour is greyish white, and they are very thickly and minutely speckled all over with what a close examination proves to be a mixture of minute dots of yellowish and reddish brown and pale purple. Some eggs have absolutely no markings except this minute dotting or stippling, but the majority have spots and blotches more or less thinly speckled over the surface (often only at the large end, always most thickly there) of intense reddish or blackish brown or even bluish black. The minute dottings in many eggs, everywhere dense, are most so at the large end, where with the blotches they occasionally form an irregular, imperfect and ill-marked, mottled or smudgy cap or zone. The general appearance of the egg, when not closely looked into, is paler or darker dingy earthy brown, with dull blackish spots and small blotches. Some of the eggs have scarcely any gloss; others are highly glossy.

The eggs vary in length from 0·8 to 1·04, and in breadth from 0·71 to 0·85; but the average of thirty is 0·94 by 0·78.

*Turnix tanki*, Buch. Ham. *The Larger Button-Quail.*

*Turnix dussumieri*, Temm., *Jerd. B. Ind.* ii, p. 599.

*Turnix joudera*, Hodgs., *Hume, Rough Draft N. & E.* no. 834.

Of the nidification of the Larger Button-Quail I know nothing personally.

Captain Oldham, of the 12th Regiment, long ago sent me an egg with the following note:—"I took the egg from the body of a Larger Button-Quail. This Quail I shot with others on the 26th of this month (August), near this station (Sealkote) in fields of Indian-corn and cotton."

Mr. Iver Macpherson, writing from Mysore, says:—"29th April, 1880. While weeding in last year's teak-plantations on the 27th, the weeders found two Quails' nests, each with four eggs.

"The eggs were according to orders left untouched, and today I visited the plantations and shot the bird off one nest, which proved to be a Larger Button-Quail. The eggs were hard-set.

"During the few days I remained out, several young birds of this species were caught."

These four eggs measured from 0.9 to 0.98 in length by 0.72 to 0.73 in breadth.

Colonel Butler writes:—"The Large Button-Quail breeds in the neighbourhood of Deesa during the rains. I found a nest on the 15th July, 1875, containing four slightly incubated eggs; it was composed of soft blades of dry grass, reminding one of the nest of a field-mouse and many half-covered nests which I have seen of *Mirafra cantillans*, the entrance-hole being on one side. It was placed at the foot of a tussock of coarse grass in a preserve, and the old bird allowed me to put my foot within a few inches of her before she flew off. After leaving the nest she fluttered along the ground for four or five yards and then feigned lameness, broken wings, &c., like other members of the family. I snared her at the nest when she returned shortly afterwards. The eggs are very handsome and considerably smaller than those of the Bustard-Quail: they are of a dirty yellowish-white colour, thickly speckled, spotted, and blotched all over with brownish black, with occasional spots and markings of inky purple and palish or dingy yellow, the whole combining in forming quite a dark confluent cap at the large end. The eggs are highly glossed and much the same shape as the eggs of *T. taigoor*, being very broad and almost round at the large end, small and pointed at the other. One or two hen birds which I shot later on in the same month would have laid in a few days had they not been destroyed."

One of these eggs measured 0.84 by 0.63.

The egg from Sealkote, which was extracted from the oviduct of the parent bird, is of the ordinary *Turnix* type. In shape it is a very broad oval, but pointed towards one end; in fact three fourths of the egg are spherical, the remaining quarter is, as it were, pinched out into a point, and this is not an uncommon shape amongst the eggs of this genus. The shell is glossless. The

ground-colour is dull white, very minutely speckled all over with pale yellowish brown and inky purple. The markings are most dense at the more obtuse end of the egg, where they are intermingled with a few small inky-grey clouds. Another egg of this species, received from Mr. Blewitt, of Raipoor, together with the parent bird, but unfortunately without particulars, is similar in size and shape and in the general character of its markings, but has a slight gloss, the ground-colour is yellowish stone-colour, the markings are brighter-coloured, and the inky clouds and spots darker and more numerous.

These two eggs measure—the first 0.88 by 0.77, and the second 0.85 by 0.73.

**Turnix dussumieri**, Temm. *The Little Button-Quail.*

*Turnix sykesii*, A. Smith, *Jerd. B. Ind.* ii, p. 600.

*Turnix dussumieri*, Temm., *Hume, Rough Draft N. & E.* no. 835.

I never succeeded in finding a nest of the Lesser Button-Quail. I have never found the bird *common* anywhere. Mr. W. Blewitt found a nest near Hansi in the Dhana Beerh on the 16th April. It was a mere depression, scratched in the ground, at the base of, and completely overhung and concealed by, a dense tuft of soft grass, and very slightly lined with a few blades of the same grass, so few that it was impossible to say whether they had fallen there by accident or had been placed there by the bird.

The nest contained only two fresh eggs.

At Sholapoore, in the Deccan, Mr. J. Davidson found a nest containing four hard-set eggs on the 17th of August, which, though he failed to secure the parent bird, undoubtedly belonged to this species. The nest was placed in a field of low bajra, and was formed in a hollow on the ground (such a hollow as would be caused by the imprint of a cow's foot), which was well lined with fine grass.

Mr. W. Theobald makes the following note of the nidification of this species in the neighbourhood of Pind Dadan Khan and Khatas in the Salt Range:—"Lay in the third week of August. Eggs, five. Shape, round pyriform. Colour, pale grey, closely freckled with dirty yellowish ochre, with a few dots of neutral, and blotched with deep reddish brown or blackish umber. Nest, a little grass, hemp, yarn, and a few hairs on the ground in a field of the bajra."

Colonel Butler found a nest of this bird near Deesa on the 29th July, with four fresh eggs, and he caught chickens of this species which must have been hatched at the commencement of June.

Captain Horace Terry writes from Madras:—"Quails of several sorts were very numerous in the neighbourhood of Bangalore during the cold weather and I found several nests, and among others those of *T. dussumieri* in November 1883. The nests, if nests they can be called, were pads of fine grass, and not much of that very often, were much the same as any other Quail's, and the eggs had very

much the appearance of those of *T. taigoor*, but of course far smaller. Four was the largest number of eggs I ever got in one nest."

The eggs of this species are very similar to, but much smaller than, those of *T. taigoor*; they are even smaller (markedly narrower) than those of *T. tanki*.

They are moderately broad ovals, much pointed towards one end, and very fairly glossy. They have a pale yellowish stone-coloured ground, minutely freckled all over with specks of yellowish and greyish brown, overlaid with somewhat larger streaks, spots, and mottlings of dark earthy brown, varying in shade in different eggs, and often much more dense towards the large end, where in some they form a sort of mottled irregular cap. Small spots or clouds of pale inky purple are usually scattered amidst the other markings.

The eggs that I have seen have only varied from 0·81 to 0·89 in length, and from 0·63 to 0·68 in breadth.

## Family GRUIDÆ.

*Grus antigone* (Linn.). *The Sarus Crane.*

*Grus antigone* (Linn.), *Jerd. B. Ind.* ii, p. 662; *Hume, Rough Draft N. & E.* no. 863.

The Sarus breeds freely over the whole of the North-West Provinces, Oudh, and Upper Bengal, and more rarely in the Punjab, Cis-Sutlej, the eastern portion of Rajpootana, and parts of the Central Provinces.

They breed in July and August, some few laying in some seasons as late as November. Soon after the first burst of the rains, *i. e.* towards the close of June, the old birds, which I may mention pair for life, begin to construct their nest. These are in nine cases out of ten on some firm spot in the midst of the largest jheel or swamp that they can find—not always an island, for they often build on sites completely overflowed, but some spot that would be an island if the water fell eight or ten inches.

The nest is a hugh heap, a broad truncated cone, composed of reeds and rushes and straw, varying much in size according to situation and circumstances. At top it is about two feet in diameter, with a central depression from four to eight inches deep for the eggs. If, as is commonly the case, the nest is placed in water, the bottom of the egg-cavity will be from eight to twelve inches above the surface of the water, and there may be six inches to two feet of nest below water. On more than one occasion, when in sudden and heavy falls such as we get in India, six and eight inches of rain falling within twelve hours, the jheels were rising very rapidly, I have seen the birds very busy raising their nests. One nest that had thus been raised I measured a couple of months

later, when the ground on which it stood was dry, and found it to be fully nine feet in diameter at base and three feet in height, and it must have lost at least a foot by settling. When built on land surrounded by but not overflowed with water, the nest is a much less pretentious affair, perhaps five feet in diameter at base and a foot only in height. Occasionally, apparently where they could not get a large enough piece of water to secure as they considered their safety, I have found them seeking this in concealment. As a rule, the nest is out in the open, visible from all directions at a mile's distance. In the few cases to which I refer I have found it in dense beds of bulrush and reed so lofty that, even when standing on its nest, the bird was only to be seen by climbing a neighbouring tree. In these cases the rushes and reeds, where they were thickest, had been bent down across and across, so as to form a platform five or six feet in diameter, and on this a comparatively slight nest had been constructed. Two is certainly the normal number of eggs, but I have twice (out of more than one hundred nests) found three, and I have also occasionally seen three young birds in company with an old pair.

I remember one day, as I was coming home from Rahun, I saw in a sheet of rain-water some distance off the road a Sarus sitting on her nest and the male standing beside her. I rode as near the place as I could, and then sent my syce to get the eggs. As he commenced wading towards the nest the male began to dance about, flapping his wings and trumpeting most bravely; but when the man got within a few yards and landed safely on the patch of dry ground on which the nest rested, the male put his head down and ran off very crestfallen to a ridge in the water some fifty yards distant, whence he began with loud cries to encourage his lady not to allow "that black rascal" to take any liberties. She sat quite still, neither moved nor cried, only as the man came close to her made such vigorous pokes and drives at him that he got frightened and was picking up a great dry branch to strike her with, when I called out to him to flap her in the face with his waist-cloth. This he did vigorously, and this being more than she could endure, she reluctantly crept off the nest, now complaining loudly, and joined the male. There was only one egg: this the man brought, but before he could reach me the female had regained the nest, and after minutely examining it and making certain the egg was gone, she stood up on the top and with bill, legs, and feet commenced throwing the straw about in the air in the most furious manner as if beside herself with rage. Then the male came up trumpeting vigorously, but directly he came near she flew at *him*, and he scrambled off, half-running, half-flapping, through the water, and making more noise than ever. By this time I had received the egg, and found the point of the young one's bill protruding, so sent the man back with it sharp. As he approached, the female ran off, but she must have seen what he was at, for before (having gently laid the egg in the disordered nest, which he smoothed a little) he could get off the island, the female was down upon the egg,

sitting as if nothing had happened, but uttering a low chuckling sound such as I had never heard before. But the real joke was to see the male: the moment he perceived that the coast was clear and that his mate was again sitting, he came back to the nest and paraded round and round, his wings extended, his head in the air, trumpeting *à ne pouvoir plus*, clearly wishing her to believe that it was all his doing.

I have heard many stories of these birds showing fight in defence of their *penates*, but this was the nearest approach to anything of the kind I ever witnessed, and, as a rule, both birds run away directly you get within twenty yards of the nest.

With dogs it is different, and I have seen a large water-retriever so buffeted, scratched, and cut in two minutes that he was fain to make off at his best pace howling and yelping, and I have no doubt that foxes or jackals would fair equally ill.

Colonel G. F. L. Marshall remarks:—"The nest is built in the rainy season, and is just a heap of grass and bushes completely surrounded by water. I took two eggs near Bolundshahr on the 25th July; the female was sitting and the male bird feeding near, but neither moved away from the jheel nor showed any inclination to interfere with the misappropriation of their eggs."

"On the 29th August, in the Muttra District, I found one egg and a young one; and in the Aligurh District, on the 8th September, I found two fresh eggs."

The Sarus occasionally lays a second time after the nest has been robbed; and Colonel Butler notes that "a single egg, which I took on the 19th September, was laid by a bird whose nest I had robbed of two eggs on the 24th August, and in the same nest; while another egg that I took on the 23rd of September was laid in a nest (not the one already referred to) out of which I had also taken a single fresh egg on the 19th September."

He further remarks:—"The Sarus Crane breeds plentifully in the marshes in Guzerat between Deesa and Ahmedabad in August, September, and October.

"The hen bird when sitting leaves the nest, if disturbed, very reluctantly, first of all raising her body gradually into an upright position and then lowering her head almost to the ground, and walking slowly away in a half-crouching attitude until she has got well away from the spot. In the breeding-season the two old birds may often be seen engaged in a kind of 'nautch,' which is most interesting and amusing to watch. They spread their wings and lower their necks like two game-cocks about to fight, then suddenly they raise themselves and commence to dance, trumpeting loudly, then one or both springs high into the air, and descends to perform the same absurd programme over again."

Writing from Tonghoo Major Wardlaw Ramsay says:—"On the 29th September 1876 a Burman brought me an egg and a newly hatched Sarus chicken."

Mr. Oates remarks:—"This bird is common in the vast plains of Lower Pegu, and I procured one egg in August."

The eggs are invariably elongated ovals, and are usually a good deal pointed towards one end; but long cylindrical varieties, narrower and more elongated than even similar varieties of the Great Bustard, are not uncommon. The shell is very hard and strong, very rarely almost devoid of gloss, *generally*, fairly, and sometimes highly glossy. The shell is in most eggs pitted with small pores, set rather wide apart, and in some specimens very conspicuous owing to the bottoms of the pores being coloured differently to the rest of the shell of the egg, and thus producing a speckled effect. Usually, however, the pits are only noticeable on close inspection, and not uncommonly they are so fine and minute as to be scarcely noticeable at all. The ground-color varies: in some it is pure white, in some clear pale sea-green, in others a sort of pinky cream-colour, and numerous intermediate shades are observable.

Some few eggs are entirely spotless and devoid of markings, but they are commonly more or less profusely studded with blotches and clouds of pale yellowish brown, purple or purplish pink. Sometimes the markings are all large, in others (but more rarely) they are small and speckly. As a rule, the markings are, I think, most numerous at the large end. In some they are conspicuously so, and in some they are entirely confined to that part of the egg. As I notice when speaking of the eggs of the Great Bustard, the eggs of this species very frequently exhibit pimples, warts, creases, and wrinkles; indeed, after examining a large series, I should say that not one in twenty was entirely free from such imperfections: but of the hundreds of specimens that I have at one time or another taken of this bird's eggs, I have never met with one anything like so richly coloured as those of the Common Crane (*Grus cinerea*), which latter, by the way, have always appeared to me, though larger and longer, to approximate somewhat in appearance to those of *Otis tarda*.

The eggs vary excessively in size, in length from 3·6 to 4·48, and in breadth from 2·35 to 2·75; but the average of fifty-one eggs is 3·96 by 2·56.

## Order FULICARIAE.

### Family OTIDIDÆ.

**Eupodotis edwardsi** (J. E. Gray). *The Great Indian Bustard.*

*Eupodotis edwardsii* (Gray), *Jerd. B. Ind.* ii, p. 607; *Hume, Rough Draft N. & E.* no. 836.

The Indian Bustard lays mostly in July and August, but the breeding-season varies a good deal according to the rainfall, and we have found eggs as early as the first half of March and as late

as the first half of September. The eggs are placed on the ground, at the base of some bush or tuft of grass, in a small depression, generally unlined, often thinly lined with a few straggling blades of grass. The situation varies: sometimes the nest is in an open waste, sparsely dotted with a few herbaceous shrubs, often in the stubble of the giant and bulrush millets, and still more often in clumps and patches of high thatching-grass, or the dense soft lemon-grass so characteristic of the favourite haunts alike of this Bustard and the Houbara.

My impression is that the birds lay only one egg. But sometimes two eggs are found pretty close together, and either the females not unfrequently lay very close to each other, or when a female does lay more than one egg she deposits the second some little distance away from the first. Khan Nizam-oo-deen Khan has taken more than a hundred of these eggs with his own hand, and he never found two eggs side by side. Where, as not unfrequently happens, two are within a yard or two of each other, he believes that they belong to different birds, and that this is a fact he has in one or two cases proved by snaring both females. I have only myself seen three nests, each containing a single egg. I can, therefore, say nothing positive on this subject.

Khan Nizam-oo-deen Khan gives the following, which I translate, in regard to the dates on, and places in, which he found the eggs of this species in 1869:—

“The first nest, containing two eggs, was found on 30th June. The eggs were discovered in waste ground, rather high and dry, dotted over with tufts of a species of lemon-grass. The eggs were overhung by one of these tufts, but, curiously enough, one egg was on one side, and the other egg was on the other side of the tuft.

“On the 1st July two nests, each containing one egg; these were both in waste land, thickly covered with the plants of the lana (*Anabasis multiflora*).

“Another nest, containing one egg, was found on the 3rd July amongst tufts of the lemon-grass.

“Another nest on the 6th July, also containing one egg, was found under a lana-bush in some high, somewhat stony waste land, thickly dotted with lemon-grass tufts.

“Another nest, containing one egg, was taken on the 10th July, the egg being placed under a solitary lana-bush in perfectly level, open ground. Other nests were taken from similar situations.

“On the 11th July one egg.

“On the 27th and 30th July and the 23rd August in each one egg, and on the 10th and 27th of August nests, each containing two eggs; in each of these latter cases the two eggs being found at some little distance from each other.

“It seems very doubtful whether these two eggs in any case belonged to the same bird. In one case doubtless the eggs were only on different sides of a large tuft of grass, but in the other instances in which two eggs were found in the same locality they were several yards apart.”

He also sends this further memorandum of eggs found in 1870:—

"No. of eggs.	Date.	Nature of locality.
1.	12-3-70.	Grass-jungle.
1.	20-3-70.	Jawar stubble-field.
1.	19-3-70.	" "
1.	19-4-70.	" "
1.	18-5-70.	Bajra "
1-2.	27-6-70.	Clump of thatching-grass.
1.	17-8-70.	Khooee-grass."

I should mention that the Khan Sahib took all these eggs in a circle of about twenty miles round Urneewalla, which is in the west of the Sirsa District, just north of Bikanir and Bhawulpoor, in both of which States some of the eggs above mentioned were secured.

Writing of the Great Indian Bustard in the Deccan, Messrs. Davidson and Wenden say:—"Common and breeds. It is very much more common during the rains and cold seasons than at other times."

The eggs of this noble bird vary very much in size and shape. They are all more or less oval; but while some are moderately broad and slightly pointed at one end, others are long ovals, exactly similar at both ends; and others again are long and cylindrical, of the same size and shape as the egg of the great Northern Diver figured by Mr. Hewitson; and I have one specimen that both in colour, shape, and size might have been the one from which his plate of the egg of the European Bustard was taken. The shells are very thick and strong, closely resembling those of the Sarus in texture, and, like those of the latter species, the eggs very commonly exhibit pimples and rugosities at the large end, so much so that out of sixty eggs now before me only seven are perfectly free from such imperfections. Some of the eggs are dull and with little gloss, the whole surface being closely pitted with small pores similar to, but fewer than, those in the Peafowl's egg, while other specimens are brilliantly glossy. The ground-colour varies much. Typically it is a sort of drab colour, but it is often earthy brown, pale olive-brown, pale reddish brown, dingy olive-green, and, although rarely, even pale leaden blue. The markings vary in extent, number, and intensity; sometimes they are pretty deep reddish-brown and clearly-marked blotches, but more usually they are pale reddish-brown clouds and streaks, sometimes so faint as to be mere mottlings, and sometimes, though rarely, altogether wanting. Occasionally the markings form an irregular blotchy cap at the large end.

As helping to give an idea of what the eggs are like, I quote here a description, made on the spot before we blew them, of six eggs that we obtained on one day, and three of which I myself took:—

"The first of these is, the Khan says, rather an exceptional egg as regards colouring. It has a *bluish*-green ground, thinly spotted and blotched with deep umber-brown, and towards one end there is a pretty conspicuous zone of spots and blotches, most of the blotches here being of a pale purplish brown. The next egg is a

very pale olive-brown, with more of a greenish than a brownish tinge, clouded, spotted, blotched, and streaked, but everywhere thinly, with brown, only slightly darker than the ground of the egg, but altogether of an umber tint instead of the olive of the ground. The next is a yellowish stone-colour, pretty thickly, but very faintly, clouded and streaked with a deeper and slightly redder tint.

“ The next egg has but very little gloss, and is a nearly uniform dark olive-brown, with only the faintest traces here and there of streaks of a darker tint. The next is an excessively glossy egg of the same colour, everywhere thickly clouded and mottled with a slightly darker and more ruddy shade of brown. The last egg is of much the same colour as the preceding, but more glossy than the former and less so than the latter. There is a conspicuous cap of nearly confluent clouds and blotches of a redder brown than the ground of the egg, and streaks and blotches of the same colour, but somewhat fainter, are scattered over the whole surface of the egg.”

Out of sixty eggs in my collection no two are precisely alike.

In length they vary from 2·75 to 3·42, and in breadth from 2·05 to 2·45 ; but the average of sixty eggs is 3·11 by 2·24.

### *Syphoetis bengalensis* (P. L. S. Müll.). *The Bengal Florican.*

*Syphoetides bengalensis* (*Gm.*), *Jerd. B. Ind.* ii, p. 616.

*Syphoetis bengalensis* (*Müll.*), *Hume, Rough Draft N. & E.* no. 838.

The Bengal Florican is almost confined to Eastern Bengal, and those portions of Bengal, Oudh, and the North-West Provinces lying north of the Ganges. Jerdon says that it spreads through the Valley of the Jumna into Rajpootana, the Cis-Sutlej States, and parts of the Punjab ; but this is, I think, quite wrong. It is the Houbara that is found in these localities, not the Bengal Florican ; but sportsmen constantly call the Houbara the Florican, and hence the mistake. I have never seen the true Florican anywhere west of the Kadir of the Ganges, except as a rare straggler in the Dhoon ; and there again it does not, to the best of my belief, extend further west than the Kadir of the Jumna. In Meerut I have killed both the Houbara and the Likh, but it is only when you get quite down into the Kadir of the Ganges at Hastinapoor and Mukdoompoor, or again southwards below Gurmooktesur, that you meet the true Florican, and here we used to pick up a few couples every cold season.

Mr. Hodgson gives an account of the manners and nidification of this species, derived chiefly from native huntsmen. He says :—

“ The Florican is neither polygamous nor monogamous, nor migratory nor solitary. These birds dwell permanently and always breed in the districts they frequent, and they dwell also socially but with a rigorous separation of the sexes, such as I fancy is paralleled in no other species. Four to eight are always found in the same vicinity, though seldom very close together, and the males are invariably and entirely apart from the females after they

have grown up. Even in the season of love the intercourse of the sexes among adults is quite transitory, and is conducted without any of that jealousy and pugnacity which so eminently distinguish most birds at that period.

"In the season of love the troops of males and females come into the same neighbourhood, but without mixing. A male that is amorously disposed steps forth, and, by a variety of very singular proceedings quite analogous to human singing and dancing, recommends himself to the neighbouring bevy of females. He rises perpendicularly in the air, humming in a deep peculiar tone and flapping his wings. He lets himself sink after he has risen some fifteen or twenty yards; and again he rises and again falls in the same manner, and with the same strange utterance; and thus perhaps five or six times, when one of the females steps forward, and with her he commences a courtship in the manner of a Turkey cock, by trailing his wings and rising and spreading his tail, humming all the time as before.

"When thus, with what I must call song and dance, the rites of Hymen have been duly performed, the male retires to his company and the female to hers; nor is there any appearance (I have at some cost had the birds watched most closely) of further or more enduring intimacy between the sexes than that just recorded, nor any evidence that the male ever lends his aid to the female in the tasks of incubation and of rearing the young.

"The procreative instinct having been satisfied, the female retires into deep grass-cover, and there, at the root of a thick tuft of grass with very little semblance of a nest, she deposits two eggs, never more or less, unless the first be destroyed. If the eggs be handled in her absence, she is sure to discover it and destroy them herself. The eggs are of the size and shape of an ordinary domestic Fowl's, but one sensibly larger and more richly coloured than the other. This larger and more highly tinted egg is that of the male young, the smaller and less richly hued egg that of the female progeny.

"The female sits on her eggs about a month, and the young can follow her very soon after they chip the egg. In a month they are able to fly; and they remain with the mother for nearly a year, or till the procreative impulse again is felt by her, when she drives off the long-since fully-grown young. Two females commonly breed near each other, whether for company or mutual aid and help; and thus the coveys (so to speak, though they are not literally such) are usually found to consist of four to six birds. The Florican breeds but once a year, in June-July, that is, the eggs are then laid, and the young hatched in July-August.

"The eggs, about the size of those of a Bantam, 2 inches long by  $1\frac{1}{2}$  inch broad, are of a sordid stramineous hue, very minutely dotted and more largely blotched and clouded with black, somewhat as in *Lobivanellus goensis* or the Indian Lapwing."

According to his manuscript notes, the Florican breeds freely in the Terai below the Sikhim and Nepal hills. They lay from the middle of May to the middle of July, and lay two eggs, which are

figured as measuring from 1.7 to 1.95 in length and from 1.35 to 1.5 in breadth. Three eggs are figured, each with the ground varying in shade—the one is pink, the second brown, and the third an olive stone-colour, and they are blotched and freckled all over, or speckled and clouded, with dark brown.

To Mr. F. A. Shillingford, of the Kolari Factory, Purneah, I am indebted for the first egg of this species that I have succeeded in procuring.

This egg is of the same type, as regards texture and coloration, as many of those which I possess of the Great Indian Bustard and Lesser Florican, but is intermediate in size, and conspicuously more elongated than those of either of the others. It is more of the shape of a hen's egg, but rather more elongated than this even, and decidedly more compressed towards the small end. The shell is firm and strong, smooth and compact, but has little gloss. The pore-pittings are very inconspicuous.

The ground-colour is a dull pale green stone-colour, and it is rather sparingly streaked and blotched with dull, rather pale brown, somewhat greyer in some spots, more olivaceous in others.

It measures 2.6 inches in length, by 1.76 in breadth.

Mr. Shillingford says:—"The Florican's egg I myself picked up in June last. The female bird was seated on it when I first saw her about 5 yards distant; when she rose, I found one egg. There was no attempt at a nest; the egg was lying on damp mud, with the few blades of grass that were growing near trodden down. Young birds have several times been caught in this district."

*Syphœtis aurita* (Lath.). *The Lesser Florican.*

*Syphœtides auritus* (Lath.), *Jerd. B. Ind.* ii, p. 619; *Hume, Rough Draft N. & E.* no. 839.

I have never myself found a nest of the Likh, but I have inquired much in regard to their nidification. Although during the winter and spring this bird strays all over India, the vast majority breed in the western half of the Peninsula, between 15° and 25° north latitude, rarely extending eastwards of 78° east longitude.

October and September are the months in which most eggs are to be met with. I have never had any authentic account of more than four eggs being found in any nest.

Writing from Sholapoor, last spring, Mr. Wenden, to whom I am greatly indebted for the trouble he has taken in procuring and sending me eggs and information, and getting others to do likewise, remarked:—"The eggs I send you were taken here last September. The nest was placed between the roots of several tufts of tussock-grass growing in black soil and in the intermediate space. The soil not being held up and protected by roots had been washed out or had sunk from the effects of rain, and thus a natural basin had been formed. In this the bird had excavated a saucer-shaped hole, perhaps 4 inches deep and 9 inches in diameter, the bottom of which was bare. Round the edges was a slight fringe of grass, which had not so much the appearance of having been placed there

by the bird for any purpose, as it had of being simply scraped away from the actual sitting place. The nest contained three eggs."

He now (November 1874) writes to me :—" My *Phansée Pardées* (native fowlers) found the first nest (if it can be so called) of the season on 15th September, with one egg ; an egg was added on the 16th, and another on 17th ; and on the 19th, finding no more eggs, I shot the male and female, and took the eggs. I send them to you, together with the skins of two other birds, and another batch of four eggs taken from another nest on the 5th October. The last nest I have heard of being found was taken on the 27th October, but I could not unfortunately procure the eggs.

" The nest taken on the 19th September was the only one which I had an opportunity of watching. The eggs were deposited on the bare ground, which was perfectly level (without the least signs even of scratching), in some thin scanty grass about 2 feet high, and about 2 yards in from the edge of the grass-patch. Not a hundred yards from the plot of grass in which the eggs were deposited is a *Kurán* (or preserve), over half a mile long by quarter broad, of very high dense grass, a far more likely place, one would have thought, for so wary a bird to lay its eggs.

" On the 16th, I went out and watched this bird for more than an hour, just about the time at which she had been flushed on the morning before from the single egg. From the tree on which I sat, with my binoculars, I saw her running rapidly out of the dense *Kurán*, across the open and into the scanty patch in which was her egg. Here she moved about for some minutes feeding, and every now and then she sprung into the air with a low clucking cry, which was answered by the male bird from the dense *Kurán*, though at first I could not see him. Then, as though a sudden thought had struck her, she darted to her nest, and after one or two springs and walking round and round the egg, she squatted and deposited another. While she sat, she was quite silent, but the male bird who, had now advanced closer to me, kept springing in the air and crying continually. The operation of laying the egg seemed to last about twenty minutes—i. e., from the time she sat to the time she rose ; and having made another spring or two, walked round the eggs and then made straight tracks for the dense grass where the male bird was calling.

" I went out quite alone on this watching expedition and all was quite quiet, and the birds were at their ease ; but while I was still in the tree a man came into the *Kurán* with some cattle, and then I saw both birds spring several times silently, and after that I saw or heard nothing of them."

Mr. J. Davidson tells us that " the Florican breeds all round Sholapoor in considerable numbers, wherever there are *Kuráns* (grass preserves) with long grass. During the breeding-season they seem chiefly to haunt the thinnest patches of long grass, rather than those full of small bushes ; they are at this period exceedingly difficult to flush, particularly the hens, which, even if you succeed in forcing them to rise, get up only at your very feet and make but very short flights. The cocks are not quite so difficult to flush,

but you are obliged to run towards them, even to get them up : if you simply walk after them, they will rarely rise. Their whereabouts is, however, generally easily discovered by their frog-like call, and their occasional sudden jumps up into the air. They do not seem to call much when the sun is bright, but chiefly in the morning and during cloudy days. I have often watched them flying or jumping up, but I am still uncertain why they do it. My original impression was that they sprung up to seize insects from the grass-stalks, but I have long abandoned this idea as they rise much above the grass. Moreover, I have only seen one bird thus rise that could have been a female, and this was dark-coloured, and probably a male that had not assumed breeding-plumage ; and I am inclined to consider these sudden flights as simply one of those bridal displays, so common in the males, especially of gallinaceous birds, such as the flapping of the wings in Pheasants, the nauth of the Peacock, and lèk of the Capercailzie, and the pouch-inflated strut of the Big Bustard, and if it can be certainly established that this habit is confined to the males, no alternative solution seems open to us.

“The nests are exceedingly hard to find, and I have only managed to secure eight eggs belonging to three nests ; they differ very much in size, ground-colour, and markings.

“The first nest I found contained a single fresh egg, which I took on the 21st September.

“The second, which I found on the 5th October, contained four slightly-set eggs (all four being of the same size and markings).

“The third nest I found on the 7th of October ; it contained three eggs of two very different types, and all slightly set.

“The nests were like those of the Great Bustard’s, mere (I can hardly call them even hollows) spaces among the thinnish long grass.”

Lieut. F. Alexander writes :—“The hen Florican commences to lay in Sholapoor and its environs about the middle of September. The eggs are from three to five in number ; almost always placed near water, and not, as a rule, in very long grass. The mating-season commences at the close of August or the beginning of September, at which time the male bird commences to jump in the grass ; this jumping is almost entirely confined to the male bird, and ceases as soon as the mating-season is over. The males are easily killed at this time, as the act of jumping is always accompanied by a call (very like a frog’s croak), and they can be followed thereby ; but as soon as you have approached within a reasonable distance, and have once caught sight of the bird, you must run at him as hard as you can, as they do not often jump in the same spot twice, unless accompanied by the female. I was fortunate enough to shoot six in this manner, in full black plumage.

“A nest of the Florican that I found on the 20th September was on bare ground ; the spot chosen was slightly cup-shaped, and was hedged in by grass about a foot in height.”

In his note on birds in the Deccan, Lieutenant Burgess tells us that “the Florican breeds during the end of the monsoon, laying

three eggs of a dark olive-green colour, spotted and dashed with light brown, 1·9 inch in length by 1·5 inch in width, the greatest width being about the centre. The egg now sent was procured with two others early in September."

Dr. Jerdon remarks :—"A few birds appear to breed in all parts of Southern India from July to November, for I have put the hen bird off her nest in August in the Dekhan and in October near Trichinopoly, and have heard of the hen having been found incubating still later, up to January indeed; but the majority breed, in Guzerat, Malwa, and Southern Rajpootana, from July to September. I have found the cock bird commencing to assume the black plumage at the end of April, and have killed them with the black ear-tuft just beginning to sprout, hardly any other black feathers having appeared. In other instances I have noticed that these ear-tufts did not make their appearance till the bird was quite mottled with black. The full and perfect breeding-plumage is generally completed during July and August. At this season the male bird generally takes up a position on some rising ground (from which it wanders but little, for many days even, and during the morning especially, but in cloudy weather at all times of the day), every now and then rises a few feet perpendicularly into the air, uttering at the same time a peculiar croaking call, more like that of a frog or cricket than that of a bird, and then drops down again. This is probably intended to attract the females, who before their eggs are laid wander greatly, or perhaps to summon a rival cock; for I have seen two in such desperate fight as to allow me to approach within thirty yards before they ceased their battle. The female lays her eggs in some thick patch of grass, four or five in number (one writer says seven), of a dark olive colour, with or without a few darker blotches, of a very thick stunted ovoid form, very obtuse at the larger end. During this season the females are very shy and wary, seldom rising, though often running great distances, and when closely approached and unable to run further perhaps without being seen, squatting so close as to allow a man or dog almost to tread on them before they take flight."

Mr. Rhodes W. Morgan, writing from South India, says :—"It breeds in April and May in low scrub-jungle. The eggs are laid under a bush, in a slight hollow; they are generally two in number."

Colonel Butler remarks :—"The Lesser Florican breeds in the neighbourhood of Deesa in July, August, and September."

The eggs, for a magnificent series of which I am indebted to Messrs. Wenden, Alexander, and J. Davidson, like those of the Great Bustard (which, though smaller, they greatly resemble), vary much in size, shape, and coloration.

Typically they are very broad ovals, with a feeble tendency to a point at one end; but some are nearly spherical, some are purely oval, while one or two approach a Plover shape.

The shell, everywhere closely pitted with minute pores, is stout but smooth, and has always a slight, and at times a brilliant, gloss.

The ground-colour varies from a clear, almost sap-green, through various shades of olive-green, drab and stone colours, to a darkish olive-brown. I have seen no specimens exhibiting the blue and bluish grounds occasionally met with in the eggs of the Great Indian Bustard.

The markings are brown, reddish or olive-brown, occasionally with a purplish tinge, in some very faint and feeble, obsolete, or nearly so, a mere mottling; in others conspicuous and strongly marked; but in the majority neither very faint nor very conspicuous. In character they are generally cloudy streaks, more or less confluent at the broader end (from which they run down parallel to the major axis), and more or less obsolete towards the smaller end. Occasionally, however, they are pretty uniformly scattered over the whole surface of the egg.

In size the eggs vary from 1.77 to 2.06 in length, and from 1.5 to 1.7 in breadth; but the average of twenty-three eggs is 1.88 nearly, by rather more than 1.59.

## Family RALLIDÆ.

### *Porphyrio poliocephalus* (Lath.). *The Purple Coot.*

*Porphyrio poliocephalus* (Lath.), *Jerd. B. Ind.* ii, p. 713.

*Porphyrio neglectus*, *Schleg.*, *Hume, Rough Draft N. & E.* no. 902.

The Purple Coot breeds all over the plains of India wherever there are large swamps and jheels with plenty of rush and weed. As a rule, not less than ten pairs breed in the same place. I have invariably in Northern India found the eggs in July and August, never earlier or later; but they are said to have been met with in June and September.

Two noteworthy points are (1st) that all the birds in the same swamp both lay and hatch off about the same time; (2nd) that in two different jheels only a dozen miles apart and apparently precisely similarly situated, there will be a difference of fifteen days or more in the period of the laying of the two colonies. Thus I have noted that one year, on the 10th August, I found every one of over a dozen nests in the Atchuldy jheel empty and the young hatched off; while on the 16th of the same month at Rahun, distant some twenty miles only, I found seventeen nests full of eggs—mostly a good deal incubated it is true, but none ready to hatch off for at least a week.

The nest is made of pieces of rush and reed in amongst thick grass and rice. Sometimes it is on the ground, sometimes, though not free, it is floating. In the latter case the bottom of the cavity will not be above an inch or two above the surface of the water, but there will be a mass of stuff submerged. Ten is the maximum

number of eggs that I have as yet found in any nest, and I have repeatedly taken seven and eight well-incubated ones.

Dr. Jerdon says that the Purple Coot "makes a large nest of grass, rice-stalks, and the like, at the edge of the water, and lays six or eight eggs of a reddish or buff ground, with numerous small dark red and purplish spots."

From Saugor Mr. F. R. Blewitt wrote:—"This Coot breeds from June to September. It makes its nest near to the edge of the water in the low rushes or amongst the lotus-leaves."

From Sind Mr. Scrope Doig tells us:—"The Purple Coot is very numerous, and all begin to lay about the first week in August."

Colonel Butler writes:—"I found a great many nests of the Purple Coot at Milana, 18 miles E. of Deesa, in August and September. In most instances they were built in large beds of dense bulrushes, but in many cases I found them in tussocks of coarse grass growing out in the water or in dead stick fences overgrown with high grass which had become submerged in the rains, some were placed at the foot of low stumpy trees growing out in the water. In height they varied from 1 foot to 3 feet above the level of the water. The nest, which is nothing but a large edition of the nest of *G. chloropus*, consists of a massive heap of sedge and rushes firmly put together, with a slight depression at the top for the eggs."

Mr. H. Parker, writing of this bird in North-west Ceylon, says:—"January and February. In Ceylon the Coots do not breed simultaneously; young birds, eggs in all stages of incubation, and partly built nests are found in the same tank. In some cases the eggs are laid at considerable intervals; I have met with a nestling, partly incubated eggs of different ages, and fresh eggs in the same nest. According to my experience six is the maximum number of eggs laid."

Colonel W. V. Legge remarks of this species:—"It breeds in Ceylon in February, March, and April, nesting on the ground near tanks and swamps."

Mr. Oates, writing from Pegu, says:—"I procured one nest with eggs in August."

The eggs of this species vary very much in size, the cubic contents of some being fully double that of others. Normally they are, I think, broad and perfect ovals, obtuse at both ends, not unlike a hen's egg in shape; but some are much more pointed towards one end, and considerably elongated varieties occur. The eggs are of much the same size as, and closely resemble those of, the European Purple Gallinule.

When fresh, the ground-colour varies from a pale pinkish stone to a beautiful pure-salmon pink, but the rosy tint disappears rapidly, and after they have been some years in the cabinet few of them exhibit any traces of it.

Writing, with a lot of fresh unblown eggs before me, many years ago, I see I said:—"The eggs vary a good deal in the ground-colour, some being greener and others pinker. They also vary a good

deal in the amount and intensity of the colour of the markings, and while a few have large bold blotches and dashes, in the majority none of the blotches exceed the eighth of an inch in diameter."

The eggs are always pretty thickly spotted, blotched, and occasionally streaked with a rich, almost lake, red, besides which there are a number of somewhat pale purple blotches, clouds, and spots, which have more or less the appearance of lying beneath the surface of the shell. When quite fresh, these are very lovely eggs, but the ground-colour and markings alike fade in the course of a comparatively short time.

The shells are firm and compact, but the eggs have little or no gloss.

In length the eggs vary from 1.76 to 2.15, and in breadth from 1.23 to 1.45; but the average of fifty-three eggs is 1.93 by 1.39.

**Fulica atra, Linn. *The Coot.***

*Fulica atra, Linn.,* *Jerd. B. Ind. ii, p. 715;* *Hume, Rough Draft N. & E. no. 903.*

The Coot breeds throughout India in large jheels and lakes that contain water all the year round. You may search vast lakes during the rainy season without finding a single bird, but you will always find that these are pieces of water that dry up entirely during part of the year; certainly in no lake in India are there such multitudes of Coots as in the Munchur Lake in Sind. They may be found in the Himalayas up to elevations of 6000 or even 8000 feet, and breed plentifully,—for instance, in the lakes in Cashmere. The nests are sometimes large conical masses of reed, rush, and weed, very strongly built in the midst of rice or rushes in water from 6 to 18 inches deep, but based upon the ground and rising several inches above the water-level. One that I measured was 3 feet in diameter at the base, 2 feet high, and about 11 inches in diameter at the top, where there was a depression or shallow cup some 8 inches across and 3 inches in depth; others, built in shallower water, are of course proportionally less massive and less broad at the base. Sometimes they are placed on dry ground in thick reeds just at the water's edge, and are not above 6 inches high. Sometimes they are more or less floating, having been built on a platform of lotus-leaves and down-bent, over-crossing rushes and reeds.

Whatever the situation, the upper 4 or 5 inches are much the same, composed of rush and flags, with a shallow depression on the top, in lining which rather finer materials than those made use of in the exterior are employed.

In the plains I have found their eggs only in July and August. In the hills they breed in May and June.

The greatest number of eggs that I have met with has been ten, but it is quite common to meet with only seven or eight fully-incubated eggs.

Mr. W. Theobald makes the following remarks on the nidification of the Common Coot in the Valley of Cashmere:—"Lays in the second week of May. Eggs, eight in number, long ovato-pyri-form. Size, 2·1 by 1·4. Colour, pale brownish grey, dotted with reddish black. Wullur Lake. Nest, pieces of dried reeds, about 6 inches long, piled together among reed, and floating on the water."

Long ago Lieutenant Burgess wrote:—"I found some of these birds breeding on the Singwa Tank, situate about eighteen miles north of the station of Ahmednuggur. On the 21st August, 1849, I obtained three eggs.

"The egg is rather more than 2·1 in length by nearly 1·5 in width, of a stone-colour, spotted with numberless small specks of brown and some larger spots of dark brown and grey."

Colonel Butler writes:—"A nest in a tank near Belgaum, 28th July, 1879, containing seven slightly incubated eggs."

The eggs of this species vary very greatly in size and shape, but are very uniform in coloration and character and size of markings. As to shape, they are perhaps typically somewhat broad ovals, slightly compressed towards one end; but eggs pointed towards both ends seem common.

The eggs have little or no gloss. The ground-colour is a pale buffy stone-colour or dull *café-au-lait*, and the whole surface is closely and evenly stippled over with minute black or blackish-brown pin-point specks; besides these a few larger specks and spots (few, if any, exceeding the size of a common pin's head) are scattered sparingly about the surface.

The eggs vary from 1·78 to 2·3 in length, and from 1·25 to 1·5 in breadth; but the average of fifty eggs is 1·98 by 1·4.

### Gallicrex cinereus (Gmel.). *The Water-cock.*

Gallicrex cristatus (*Lath.*), *Jerd. B. Ind.* ii, p. 716.

Gallicrex cinereus (*Gm.*), *Hume, Rough Draft N. & E.* no. 904.

The Water-Cock, so far as our Indian Empire is concerned, is, I think, restricted to tracts where the rainfall is not less than 40 inches and where night frosts are unknown.

It is common on the western coast of the Peninsula, in the eastern portions of the Central Provinces, and in the neighbourhood of the Mahanuddy, throughout Lower Bengal, and all the better-watered countries eastward to Formosa, throughout Arakan, Lower Pegu, and Tenasserim, and in the Andamans and Ceylon; but it is almost unknown in the drier portions of the centre of the Peninsula, Behar, and the North-West Provinces (except in the sub-Himalayan zone), the Punjab, Rajpootana, and Sind.

It is only in Lower Bengal that I have seen the nests; here they breed in July and August in swamps and rice-fields, making sometimes a large Coot-like nest of flags and rice-straw in the midst of a dense tangled mass of reeds, rush, and water-weeds,

and sometimes a comparatively slight one of fine rush and grass on the floating leaves of lotus and singhara (*Trapa bispinosa*).

I have never found any but fresh eggs, and never more than five eggs in any nest; but the boatmen declare that they lay as many as the Coots and Water-hens, viz., eight to ten or even more. Few of my correspondents seem to have taken the eggs. My friend the late Mr. Valentine Irwin, for some time officiating Collector of Tipperah, sent me four eggs, and wrote to me as follows:—

“I took two nests of this species near Commillah, in Tipperah, in August: the one contained two fresh, and the other two half-hatched eggs. The nests were composed of very fine grass, laid on floating leaves of water-plants, in a large jheel. There was about 4 feet of water where I found the nests.”

Colonel W. V. Legge remarks of the Water-cock:—“It breeds in the south of Ceylon in July and August.”

Mr. Oates, writing from Pegu, says:—

“July 17th. One nest with three eggs.

“August 7th. One nest with three eggs, and a fourth was taken from the female bird. Makes its nest in rank grass near paddy-fields.”

The eggs of this species vary somewhat in size and in intensity of marking, but all that I have seen have been very beautiful. In shape they are moderately elongated ovals, in some cases almost perfectly symmetrical at both ends, in others slightly compressed or pointed towards one end. In texture they are fine and compact, but they are less glossy than most eggs of this family. The ground-colour is a pale yellowish or fawnish stone-colour, sometimes with a faint greenish tinge, occasionally almost white, and they are commonly thickly blotched and streaked with brownish red or in some only slightly reddish brown and purple, or, again, in some deep red. The markings are generally most numerous towards the larger end, where they form in many cases a mottled or clouded cap. In some specimens both sets of colours, the brownish-red and purple, are slightly dingy; in others they are excessively bright and beautiful. In some the markings are very bold and comparatively widely separated; in others the whole surface of the egg is closely mottled and freckled all over, so as to leave but little of the ground-colour visible. At times many of the markings are encircled by a broad halo or nimbus of the same colour, but much lighter in shade. In a common type of the egg all the markings are streaky and the whole egg is densely streaked in a mottled and clouded manner with moderately pale brownish red, in which streakings are intermingled patches of deeper and more purplish red.

In length they vary from 1.58 to 1.8, and in breadth from 1.12 to 1.3; but the average of a dozen eggs is 1.7 by 1.27.

*Gallinula chloropus* (Linn.). *The Moor-hen.*

*Gallinula chloropus* (Linn.), *Jerd. B. Ind.* ii, p. 718; *Hume, Rough Draft N. & E.* no. 905.

The Moor-hen breeds pretty well throughout India, alike in the plains and in the hills, as high as Ootacamund in the Nilghiris, and up to 6000 feet in the Himalayas, as in Cashmere, or near Syree below Simla.

In the hills they seem to have two broods, laying first early in May and again in the latter half of July. In the plains I have only found their nests in July, August, and September, and the majority in August. A very small patch of swamp and rush will satisfy the Moor-hen as a nesting-site.

The nest varies much in size and situation. Sometimes there is no nest at all, only a quantity of rush and rice bent down *in situ* to form a platform to support the eggs. Sometimes it is built up in the water like a Coot's. Often it is in some tuft or tussock of grass in a swamp, ditch, or pond. Occasionally it is wedged up several inches above the water in some tamarisk or babool bush growing in a lake or jheel. In these latter cases, and I have seen two such, the nest is rather neater and more carefully built, composed of soft dry flag, with a well-formed shallow circular cavity lined with somewhat finer rush. Generally the nest, when there is one, though firm enough (not nearly so firm, however, as a Coot's) is a rather ragged affair, the lower portion rotting in the water and the upper part very carelessly put together, of dry or half-dry straw, flags, rush, or reed, and not unfrequently an admixture of weeds.

I think nine is the full complement of eggs, but many more (whether belonging to one or more females I cannot say) are occasionally met with in one nest. I quote here a few of my old notes :—

“August 14th, Achulda Jheel, Zillah Etawah.—We found several nests of this bird. The jheel is a shallow one, entirely grown over with wild rice. Where the rice is thickest, a dozen or twenty stems were bent down to near the level of the water, and there a sort of hollow was made apparently by the bird sitting on the bent-down stems, and in this, without any other pretence for a nest, the eggs were laid. In one we found nine, but in others only two and one, eggs ; all were fresh. The ground-colour was pale drab or stone-colour, thinly but pretty uniformly spotted and speckled with brownish red or maroon. In some the ground-colour is more pink ; in others more cold and stone-like. Most of the eggs, besides the specks and spots, exhibit a few blotches of the same colour ; perhaps there is a tendency for these blotches to be more frequent towards the large end. The eggs vary a good deal in size and shape, and in the amount of markings, but the general character is rather a long oval, a good deal compressed towards the small end.”

“Rahun, August 16th, 1867.—Found eight more nests, eggs nearly fresh. We did not get more than nine eggs in any nest. Those we took were exactly similar to those above described.”

*“August 23rd.—Took a nest at Achulda Jheel, a moderate-sized one, built of green rushes and rice-stems, on a tuft of grass. It contained fourteen eggs belonging, apparently, to at least three birds. Four of the eggs were hard-set, ready to hatch off. Three or four were partly incubated, say about nine days. The rest were quite fresh, and the nest seemed not nearly large enough to contain such a number of eggs. It is just possible that they may all have belonged to one bird, and that the different stages in which we find the eggs have resulted, not from incubation, but from the heat of the sun and of the fermenting materials on which the eggs were laid.”*

Mr. W. Theobald makes the following remarks on the nidification of the Moor-hen in the Valley of Cashmere:—“Lays in the second week of May. Eggs, ovato-pyriform, measuring from 1·57 to 1·7 in length, and from 1·11 to 1·26 in breadth. Colour, pale grey or reddish grey, dotted and spotted with deep reddish brown. Nest, a few weeds heaped on the water among reeds.”

Colonel Butler writes:—“I took numerous nests of the common Moor-hen at Milana, 18 miles from Deesa, in August and September, 1876. Dates as follows:—

“ Aug. 21st.	Several nests containing from 4 to 6 fresh eggs.
“ 22nd.	3            “            “            4, 5, 6 eggs respectively.
“ 26th.	2            “            “            8, 1 egg respectively.
“ 29th.	3            “            “            1, 2, 3 eggs respectively.
Sept. 12th.	1            nest            “            3 fresh eggs.
“ 13th.	1            “            “            2 fresh eggs.
“ 15th.	1            “            “            5 fresh eggs.
“ 26th.	1            “            “            3 fresh eggs.
“ 27th.	1            “            “            6 fresh eggs.

“The nests are always either in or close to the water; sometimes at the foot of trees or in bushes growing out in the water; sometimes in tussocks of coarse grass; sometimes in dead stick fences overgrown with long grass, but most generally I think in bulrushes or long reeds. The nest is a substantial mass of sedge and rushes, carefully but somewhat loosely constructed, and as a rule rests on the surface of the water when built in reeds or rushes, but I have seen nests standing in tall bulrushes as high as 5 feet from the water.”

According to Mr. H. Parker, the Moor-hen breeds in the Northwest of Ceylon in January and February.

Mr. Oates writes from Pegu:—“Nest with five eggs on 6th August. This is, however, one of my finds which is not so well authenticated as I should wish.”

This bird lays, as might be expected, similar eggs in India and in Europe. I have compared numerous specimens from both localities, and have found them almost undistinguishable. If any difference is observable, it consists in the preponderance in Indian examples of large well-defined markings, and in the English eggs of minute specks. In size, however, Indian examples are less subject to variation. The shell is compact and firm, with little or no gloss.

In shape the eggs are normally moderately broad, nearly perfect ovals, slightly compressed towards one end, but somewhat more pointed or elongated examples occur. The ground is a pale stone-colour, commonly tinted with pink when fresh. Some eggs are a very pale pinkish-drab colour; others, almost pale whitish brown. They are more or less thickly sprinkled with spots, specks, and moderate-sized blotches of deep red, reddish brown, and purple, as the case may be. The larger markings are not unfrequently surrounded by a reddish halo, and the general appearance of the egg is very commonly streaky, owing to the markings being often more or less grouped along irregular lines running lengthways with the egg.

In length the eggs vary from 1.51 to 1.79, and in breadth from 1.16 to 1.25; but the average of twenty eggs is 1.62 by 1.21 \*.

*Erythra phœnicura* (Penn.). *The White-breasted Water-hen.*

*Gallinula phœnicura* (Penn.), *Jerd. B. Ind.* ii, p. 720; *Hume, Rough Draft N. & E.* no. 907.

The White-breasted Water-hen breeds throughout India and Burma, in the less arid portions of the Empire, but it is very rare, a mere straggler in fact, in the drier portions of the North-West Provinces, the Punjab, Rajpootana, and Sind. It is common in the Andamans and Nicobars, and we got it in Sumatra. I never yet obtained the nest, but when at Bareilly I ascertained that it bred in August, laying its eggs in the midst of the thick bamboo-clumps that there encircle so many groves and ponds.

Mr. Blewitt obtained a nest in Saugor on the 11th August, and two towards the end of the same month near Raipore.

Mr. Blewitt says:—“The White-breasted Water-hen is to be found in numbers in the many tanks and the dense thickets and hedge-rows bordering them, in the districts of Raipore and Sumbulpore. It breeds from, I believe, the middle of July to September.

“In August 1872, in a thicket surrounding a large village tank, some fifty miles west of Raipore, a nest was found with five eggs. It was some five feet from the ground, ingeniously made, and concealed in the branches of a thick-growing bush. The nest was a roughly-constructed mass of twigs, lined with a good layer of dead leaves.

“In July last year, in the same locality, another nest, similarly situated and constructed, was secured, also containing five eggs.

“Again in August, in the high weeds fringing a swamp, a floating nest containing five eggs was taken. This nest, about 16 inches in diameter and 9 inches in depth, was exclusively composed

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\* I omit from this edition the *Gallinula burnesi* of Blyth, a bird which no one has again met with since Blyth described it.

of weeds, and had a large secure egg-cavity. The water where this nest was found was about four feet deep."

Mr. E. H. Aitken, in a letter which I published in 'Stray Feathers,' has given a very interesting account of the nidification of this species in the neighbourhood of Bombay. He says:—"In September 1868 I was living at Bombay in a house surrounded by very low-lying fields, which were under water nearly all the monsoon, and of course became the resort of various water-birds. Among them this year were half-a-dozen of this *Gallinula*, which very soon made their presence known by their awful cries. I cannot understand Dr. Jerdon dismissing the cry of this bird, if he ever heard it during the breeding-season, with the words 'has a loud call.' Anything more unearthly proceeding from the throat of a bird I never heard. It began with loud harsh roars which might have been elicited from a bear by roasting it slowly over a large fire, then suddenly change to a clear note repeated like the coo of a Dove. Often in the morning two or three of these birds might be seen in some little open space, fighting like young cock-chickens.

"When flushed they seldom flew far, seeming to trust more to their legs than their wings. After a time the cries ceased and the birds were rarely seen, so I concluded they must have their nests now, and set myself to find them. Day after day I waded through the dirty water and long grass (in which I had myself caught gigantic water-bugs, nearly three inches long, and other horrible creatures innumerable), searching every accessible bush and likely place along the edges of the fields, but all in vain. The birds were there, for I often flushed them, but for a long time all my efforts to find the nest were utterly baffled.

"It little occurred to me that while I was poking among bushes and grass where orthodox birds of that class ought to breed, my Water-hen might be sitting over my head, looking down at me. One morning, however, a native cultivator, whom I had told to search also, happened to see one of the birds going up a middle-sized date-palm that stood out of the water, in the top of which there seemed to be an old Crow's nest. He was soon up too, and after clearing away a good deal of rubbish, he took down the nest and brought it to me in triumph. The nest was rather flat, but might have been an old Crow's. It contained four eggs of a brownish-white colour, not very thickly covered with spots of three colours—light brown, dark rusty brown, and pale purplish blue. They were rather larger than a Crow's. I was sorry to find, however, that they were very nearly hatched; the whole four were cracked and I could hear the chicks chirping distinctly inside; so I made the man go up again and fix the nest securely in its place, and soon had the satisfaction of seeing the old bird making its way up to it, not flying, but running up the rough bark of the date like a ladder. A day or two after the nest was empty, and at the bottom of the tree I found a fragment of an egg, which I have before me now.

I was anxious to know how the bird would get its young ones down, but I failed to catch it in the act."

Mr. W. Theobald makes the following remarks on the nidification of this species in Monghyr:—"Lays in the first week of August. Eggs, seven in number, long ovato-pyriform. Size, 1·70 by 1·10. Colour dark brownish cream, much spotted and blotched with brownish red. Nest, of weeds in jheels."

Mr. Scrope Doig writes from Sind:—"Very common on the Narra from the middle of June to August; they can be heard calling all over the country, and when two or more male birds come across one another, the noise they make is atrocious; at other times, that is when single, they generally have one note which at a distance sounds almost exactly like the noise the servants make when pounding coffee or spice in an iron pestle, a sharp metallic sound, which is sometimes kept on all night long."

"Nearly every nest I took contained seven eggs, never more; in fact the nest could not contain more. The nests were made of coarse sedge, and were generally in some thorny bush in the water and which had grass growing up through it. The nest was comparatively shallow, and the wonder to me was that the bird in going on and off her nest did not knock the eggs out."

Colonel Butler remarks:—"The White-breasted Water-hen breeds in the neighbourhood of Deesa during the rains in July, August, and September. I found a nest at Milana, 18 miles east of Deesa, on the 26th of August 1876, containing one fresh egg. It consisted of a mass of sedge and rush floating on the surface of the water, amongst some long thin reeds growing in a tank covered with every description of aquatic vegetation, exactly resembling the nest of *G. chloropus*."

He continues:—"Belgaum, 17th August, 1879, a nest in a sugarcane field surrounded by inundated cornfields, containing six fresh eggs. It was built about halfway up the sugarcane, some three feet from the ground.

"Another nest, same date, in a tank, built in long rushy grass growing out in the water, raised a few inches above the level of the water, containing six incubated eggs. Both nests were solid heaps of rushes, with a moderately deep depression at the top for the eggs. On the 21st August, in the same neighbourhood, I observed a brood of young ones about three weeks old."

The late Major Cock wrote:—"A common bird at Sitapore, the bamboo clumps on the outskirts of every village would always yield one or two nests in July or August. The nests are usually placed high up in the clumps, and are difficult to get at except by a ladder laid on the clump. The nest is a large loosely made structure of dried grass, bamboo-leaves and twigs, and the number of eggs found was usually eight."

Messrs. Davidson and Wenden remark of this bird in the Deccan:—"Tolerably common, and breeds. Five nests taken at Nulwar in July."

Mr. Rhodes W. Morgan, writing from South India, says :—" It breeds in low bushes in October."

Colonel W. V. Legge, writing from Ceylon, remarks :—" I have found the eggs of *E. phoenicura* in the Western Province from the beginning of June to the latter part of September. On the edge of Colombo Lake, a number of nests taken were constructed in a variety of situations : some on the ground, of reeds and grass-stalks ; others on tussocks out in the water and made of the same materials, laid on the top of the tussock, the stalks of which were beaten down for a foundation ; others on the branches of the screw-pine (*Pandanus*), one of these being at a height of ten feet from the ground. These last were flat and shallow, and made of the leaves of aquatic plants and blades of rushes. As a rule, the top of the nest is almost flat, without any hollow for the reception of the eggs, and the materials of the interior are generally laid across each other, somewhat regularly. One nest, found on the branches of a *Pandanus*, was constructed entirely of the dead stems of a creeper with which the screw-pine was covered."

Referring to Pegu, Mr. Oates says :—" This bird always constructs its nest in trees at heights not below 10 feet. It selects a creeper-grown tree either in paddy-land or on the outskirts of forest. I failed to find the nest at Thayetmyo, because I looked for it on the ground. A bamboo-bush, the branches of which are well entangled, is also much affected. The nest is merely an irregular platform of dead and green leaves resting on a few twigs. One nest, found on the 10th June, contained four eggs ; and another found on the 24th of the same month, contained also four well-incubated eggs."

Major Bingham remarks from Tenasserim :—" Eight eggs and a dead female bird of this species were brought in to me by a Karen on the 29th August, 1880, at Kaukarit on the Houndraw. There is no mistaking the eggs, of which I have taken numbers before with my own hand, but eight seems an extraordinary number for one nest."

Taking a large series, I should say that these eggs are typically moderately elongated, slightly cylindrical ovals, generally rather obtuse at both ends ; the ground-colour a sort of creamy stone-colour ; the markings a large mottled irregular cap of slightly brownish red at one end, with streaks and streakily arranged strings of blotches running down from this towards the other end of the egg, and sundry more or less linear specks of the same red scattered about the rest of the egg, in some thickly, in some thinly, and with a few pale purple spots, streaks, and small blotches sparsely distributed about the egg, chiefly in amongst and in the immediate neighbourhood of the blotches of the cap, where the red is generally brightest.

The eggs vary from 1.43 to 1.7 in length, and from 1.11 to 1.21 in breadth ; but the average of twenty eggs is 1.57 by 1.18 nearly.

*Porzana pusilla* (Pall.). *Pallas's Crake.*Porzana pygmæa (Naum.), *Jerd. B. Ind.* ii, p. 723.Zapornia pygmæa (Naum.), *Hume, Rough Draft N. & E.* no. 910.

Pallas's Crake is pretty generally distributed throughout India, alike in the plains and the hills, up to 4000 or 5000 feet, except in Sind. It is not very common anywhere in the plains, and is perhaps at times mistaken for a Quail. It is of much the same size, looks on the wing of much the same colour, and takes short flights over the rushes, and drops suddenly just like a Quail. Somehow it is certainly, as a rule, overlooked, and, so far as I know, Mr. Brooks and myself were the first persons who obtained the eggs in India.

This species lays in July, August, and September in the plains of Upper India, and in June and July in Cashmere and the valleys in the lower ranges of the Himalayas containing suitable rice-swamps or marshy pools. It is pretty common near Syree, below Simla. The full number of eggs is, I believe, eight, as we found the fragments of this number of shells round a nest that had hatched off. Six is the greatest number of eggs that I have yet obtained, but then I have only seen two nests with eggs. The nest is made of rush and weed, completely concealed in water-grass, wild rush, and the like, and is apparently usually placed very little above the water-level.

At the Achulda Jheel, Zillah Etawah, Mr. Brooks and I took a nest of this bird containing three fresh eggs on August 16th, 1867. The nest was of rush and weed in the midst of grass and wild rice, very little above the water's surface. The eggs were oval, rather glossy, of a pale olive-brown, thickly mottled and blurred with specks, spots, and blotches (most numerous at the large ends) of a darker shade of olive-brown and of a sort of purplish brown.

At Syree, below Simla, at an elevation of about 4000 feet, I found a precisely similar nest in amongst dense rushes and sedges on the margin of a small swampy pond encircled by rice-fields. This was on the 19th June. This nest contained six deeply-set eggs. Next year in July we found no less than three similar nests in the same place, all unfortunately just hatched off.

Colonel Butler writes:—"Six fresh eggs of this Crake were brought to me, on the 26th of September 1876, from Milana, 18 miles east of Deesa. They were taken by one of my own nest-seekers in a small clump of bulrushes growing in a tank, and the nest, which he pointed out to me on the following day, was built in the rushes 3 or 4 feet above the level of the water, and looked for all the world like a miniature nest of *G. chloropus*, being composed of the same material (sedge and rush) and constructed in exactly the same manner. The eggs are much in size and shape like Rain-Quail's eggs."

The egg of Pallas's Crake is oval, slightly pointed towards one end; the shell of a firm and compact texture, and with a slight gloss. The ground-colour is a sort of a pale olive stone-colour, or very slightly greenish drab, thickly freckled and mottled with faint

dusky clouds and streaks, which in all the eggs that I have seen were most densely set towards the large end. The dusky markings in some eggs are a sort of pale sepia, but in others have a distinctly purplish tinge. They appear, however, to be at all times dull, inconspicuous, and ill-defined. The eggs vary in length from 1.1 to 1.22, and in breadth from 0.83 to 0.91.

**Porzana fusca (Linn.). The Ruddy Crake.**

*Porzana fusca (Linn.),* *Jerd. B. Ind.* ii, p. 724.

*Rallina fusca (Linn.),* *Hume, Rough Draft N. & E.* no. 911.

The Ruddy Crake, so far as my experience is concerned, is almost exclusively confined to the moister portions of the Empire where the rainfall exceeds 40 inches. Dr. Jerdon says, "It is not very common in the south but is more abundant in the north;" but, as a matter of fact, it is of *extreme* rarity throughout the Central and North-West Provinces, the Punjab and Rajpootana; and it is only in Lower and Eastern Bengal that I have seen it abundant, or have either found or heard of its breeding in the plains.

Here it lays at any rate from July to September, making a nest of weeds and grass, reed or rush, just like Pallas's Crake and in precisely similar situations, but somewhat larger and more substantial.

Two nests that I found contained five and three eggs respectively, the former slightly incubated, the latter fresh. No one has given me any further information about the nidification of this species. Mr. Oates obtained a pair near Thayetmyo that were doubtless breeding, but he failed to find the nest.

The late Dr. Stoliczka wrote to me:—" *P. fusca* breeds in July on the Woolar Lake (Cashmere)."

The eggs are moderately broad ovals, somewhat pointed occasionally at one end. The shell is tolerably fine, but there is little or no gloss. The ground-colour is pinky or creamy white, and they are more or less streaked, spotted, and blotched with brownish red or reddish brown. There are a number of pale inky-purple spots intermingled, chiefly at the broad end, with the red markings, which latter, I should note, vary much in shade and hue, being in some eggs almost deep red, in others almost dull brown. The markings are nowhere dense, but they are much more numerous towards the large end.

In length they vary from 1.16 to 1.27, and in breadth from 0.8 to 0.89; but the average of fifteen eggs is 1.2 by 0.84.

**Porzana akool (Sykes). The Brown Crake.**

*Porzana akool (Sykes),* *Jerd. B. Ind.* ii, p. 721; *Hume, Rough Draft N. & E.* no. 908.

I have never seen a nest of the Brown Crake. Mr. F. R. Blewitt, who first took its eggs in 1868, says:—" I must consider the Brown Crake a rather rare bird. For forty years an ardent sportsman

and specially devoted to snipe-shooting, I have only met with it in Jhansie, Saugor, and Raipore ; in the Sumbulpoor District, I frequently searched for it in favourable localities, but without success. In the Raipore District itself the Rail is very rare ; only on four occasions did I and my men meet with it. I have met with it nearly always singly : on rare occasions in pairs. Its favourite resorts are swamps, the reeds and bushes on the edges of streams, and the tangled amphibious coverts on the borders of watercourses. A favourite place of abode too is the marshy ground occupied by kewrah plants, the branches and broad leaves of which it ascends like *Erythra phoenicura*, with wonderful agility. I have always found it a shy bird, seeking at once a place of security on the slightest alarm. Frequently I have witnessed it half emerge from the rushes, either to feed or change its retreat, and then pause, carefully scanning the neighbourhood before venturing outward. When walking, it ever and anon jerks up its short tail. It runs with rapidity, and when once concealed it is very difficult to flush it ; indeed, it would appear rightly to trust far more for safety to its speed of foot and aptitude for concealment than to its powers of flight.

“Slowly and heavily does it fly, and never to any distance, and with good dogs it may be run down and secured. This Rail has a low short plaintive note, which, however, I have only heard it utter at daydawn and just before sunset.

“I do not know much about its nidification, for I have taken but few nests. It begins to pair in April, and lays from May to August. The first nest I obtained I took at Jhansie on the 7th August, 1868. It was placed just above the bank of a small nullah, on a low-growing wild carounda bush. It was simply a collection of thin twigs and grass put together just like the nest of a Dove, only in size a little larger. The nest was placed about the centre of the bush, about six feet from the ground, between and upheld by numerous slender branches. It contained two fresh eggs, and a third was laid by the female bird, which was much injured unfortunately in capturing her, and which died in laying it.

“On the 27th May and on different dates in June 1869, in the Saugor District, my men secured three nests, with four eggs each, in the high grass and rushes growing on the islets in the Dhussain River, ten miles west of Saugor. The first nest was discovered by one of the party, who had to return for the stuffers to shoot the parent bird. When, however, some six hours after they came to take the eggs, they found that one egg had hatched off, and that a second young one was freeing itself from the shell. The other two eggs, with the female, were secured. Strange but true, the escaped young bird eluded the pursuit of the men by diving and hiding in the reeds in the water. A week after, the second and third nests, with four eggs each, were similarly found. They were one and all rough constructions, exclusively made of the surrounding grass and rushes on the high ground of the islets, piled up loosely to the height of about six inches, with a slight depression in the centre for

the eggs. I think it was about the end of June that, as my men and I were inspecting the islets in this Dhussain River for eggs, four nearly half-fledged brown Rails, of one family no doubt, suddenly dropped from an islet, where they were secreted, into the river. We gave immediate chase and surrounded them, but they baffled us in the grass and rush-clumps and mysteriously disappeared. We searched the islet and every likely hiding-place for them without success; at last spying a hole, about a foot in diameter in the left bank just above the water edge, I told one of the men to insert his arm in it, and to our utter astonishment he brought out, one after the other, the four young birds. How they all managed to elude us, and find their way to this supposed place of security, passes comprehension.

“I suspect four is the maximum number of eggs laid.”

Colonel Butler found numerous nests of this Rail at Milana near Deesa, from the 22nd August to the 28th September, and he is of opinion that these birds lay twice in the year, viz. in July and in September. The nests were mostly built in bushes overhanging the water, in bulrushes or tussocks of long grass or in dead thorns. They were substantially built of sedge, and in many cases the sedges were drawn up over the nest so as to form a canopy. The number of eggs varied from 4 to 8 in each nest.

From Sikkim Mr. Gammie writes:—“A specimen of the Brown Crake, with three eggs, was brought to me in the first week in June. The statement of the native who brought it is, that he shot the bird while actually sitting on her eggs and smashed the fourth egg; that the nest was in the Terai, near the foot of the hills, and was made of rough grasses and placed a foot or two from the ground, in the middle of a grassy bush growing in a small marsh.”

The egg of this species, though somewhat larger, strongly reminds us of that of the English Water-Rail. The eggs are very perfect ovals, only slightly compressed towards one end; and the shells, though fine, are almost entirely destitute of gloss. The ground-colour is nearly pure white, with however, when quite fresh, a faint tinge, in some of salmon-pink, in others of yellow, which, however, generally disappears after the eggs have been kept a few months. The markings are streaky blotches and spots, usually very dense at the large end, but thinly scattered elsewhere. In colour they are purplish or brownish red, and somewhat pale purple, the latter seeming to underlie the former in clouds and streaks.

The eggs, of which I have, however, but few specimens, vary from 1.4 to 1.57 in length, and from 0.99 to 1.15 in breadth; but the average of sixteen eggs is 1.49 by 1.1.

**Rallina canningi (Tytl.). *The Andaman Banded Crake.***

*Rallina canningi (Tytl.), Hume, Cat. no. 912 ter.*

From the Andamans, Mr. F. A. de Roepstorff kindly sent me the eggs of this species, together with the parent bird, with the following note:—“On the 17th of July a convict, who was out cutting

guinea-grass, noticed a bird sitting on her nest. He put his cloth over the bird, which was sitting on six eggs. The nest was merely a lot of grass rolled together. He brought the bird and the eggs in to me. The guinea-grass grows under a lot of big trees left standing at the edge of the jungle, and the nest was in a hollow a little above a small wet-weather stream on a projecting root."

The eggs are broad, very regular ovals, scarcely narrowed at the smaller end. The shell is fine, glossless in some specimens, with a faint gloss in others. The ground-colour varies from pinky white to a rich pinky stone-colour, or even warm *café-au-lait*, and they are boldly streaked and blotched, chiefly about the large end, with maroon-red and reddish purple of varying shades and degrees of intensity in different specimens; spots and specks of the same tints are scattered over the rest of the surface of the egg, but it is only towards the large end that the markings are large or thickly set.

The eggs vary from 1.35 to 1.44 in length, and from 1.05 to 1.13 in breadth.

### Hypotænidia striata (Linn.). *The Blue-breasted Banded Rail.*

*Rallus striatus*, Linn., *Jerd. B. Ind.* ii, p. 726.

*Hypotænidia striata* (Linn.), *Hume, Rough Draft N. & E.* no. 913.

The Blue-breasted Banded Rail breeds from May to October according to locality. The nest, a pad or heap of grass varying from one to twelve inches in height and from six to ten inches in diameter at top, where there is a small depression for the eggs, is always placed in grass, rushes, or standing rice in the immediate neighbourhood of water.

Dr. Jerdon says:—"It probably breeds in the well-watered districts of Bengal, &c. I found its nest in a swamp below Rangoon, containing six eggs, reddish cream-colour with dark red and brown spots."

Colonel Butler writes from Belgaum:—"Belgaum, 15th August, 1880. A nest in a rice-field on a small mound of earth about one foot above the level of the ground. The field was damp but not very wet, and the nest, which consisted of a pad of dry grass, contained nine slightly incubated eggs."

"Another nest taken on the same date contained eight eggs, also slightly incubated. The nest was similar to the one above described, but was built in longish grass in swampy ground adjoining rice-fields.

"On the 2nd September, 1880, I shot a hen bird, in a rice-field near Belgaum, that was just going to lay, but unfortunately the egg was broken by the shot. On the 11th September one of my nest-seekers took another nest in a rice-field containing six fresh eggs.

"Another nest containing seven fresh eggs on the 17th September, 1880, and one with seven incubated eggs in long rushes growing round a tank on the 27th September same year."

Mr. J. R. Cripps found a nest of this Rail in Sylhet on the 22nd of June, containing four fresh eggs.

Mr. J. Darling, Junior, writes from Southern India:—"Nest found at Sultan's Battery, Wynnaad, 2000 feet above the sea, on 26th August, 1874. The nest was built in some long grass by the side of a small swamp, bounded on one side by the Government Road, and other sides by bamboo jungle. It was in a tuft of grass, the grass concealing it well, and measured 6 inches in diameter and 8 inches deep. The entire nest was built of grass, from top to bottom; the foundation was decayed but the top was green grass, as if the bird went on putting grass under the eggs. There were five eggs in the nest."

Major Wardlaw Ramsay remarks:—"The Blue-breasted Rail breeds at Tonghoo in August and September. I took a nest on the 20th September 1874, containing five eggs. The bird is common at Rangoon and Tonghoo."

Mr. Oates found numerous nests of this Rail in Pegu from the 1st of July to the 11th October. They were generally built in the coarse grass which grows between the paddy-fields, and were small pads of vegetable matter on or near the ground. The eggs are usually six or seven in number.

The eggs of this species though all of the same type differ a great deal *inter se*. Typically they are very regular ovals, but a good many are decidedly compressed towards the small end; some are rather more elongated and occasionally an almost pyriform egg is met with.

The ground-colour varies from almost pure white to a rich salmon-pink, though pinky white or pinky stone-colour is most usual.

The majority of eggs have scarcely any gloss, but I have one or two specimens very fairly glossy; the markings consist of bold blotches chiefly about the large end, and moderate-sized spots and specks, more or less thinly distributed about the rest of the egg; but some eggs almost entirely want the larger blotches and are somewhat more thickly set with the smaller spots; while some again have only a number of moderate-sized spots about the large end and scarcely any markings elsewhere.

In colour the markings vary from bright burnt sienna-red to dull reddish purple, while besides these, which we may call primary markings, a number of spots or blotches of pale subsurface-looking greyish lilac occur in most eggs, but chiefly about the large end, and very often these latter markings are far more numerous than the former.

The eggs vary from 1.3 to 1.4 in length and from 0.98 to 1.13 in breadth; but the average is 1.35 by 1.02.

***Hypotænidia obscuriora*, Hume. *The Andaman Banded Rail.***

*Hypotænidia obscuriora*, Hume; Hume, Cat. no. 913 bis.

Two nests of this species, taken in May and July, were mere pads

of grass, placed in tufts of grass and rush near the edges of clearings in the neighbourhood of Aberdeen. They contained four and six eggs respectively.

All these eggs, as well as two previously sent me by Captain Wimberley, are precisely similar. They are very regular ovals, usually slightly more pointed at one end, and with a faint gloss. The ground varies from nearly white to a pale brown or pinkish stone-colour, and it is more or less sparingly spotted, streaked, blotched, and speckled with a rather rich red or brownish red. These markings are somewhat more numerous towards the large end, where, in some, they form an irregular cap. Besides these primary markings, a number of pale purple clouds and spots are scattered about the egg, mostly towards the large end.

The eggs vary from 1.38 to 1.48 in length and from 1.05 to 1.14 in breadth; but the average of twelve is 1.43 by 1.00.

## Order PYGOPODES.

### *Podiceps cristatus* (Linn.). *The Crested Grebe.*

*Podiceps cristatus* (Linn.), *Jerd. B. Ind.* ii, p. 821; *Hume, Rough Draft N. & E.* no. 974.

The Crested Grebe is a cold-weather visitant to the whole of Continental India, but, except along the Sind Coast and in the sub-Himalayan districts, it is nowhere, so far as I know, at all common.

Personally I know nothing of its nidification, but it breeds, I understand, commonly in the lakes of Cashmere, and Mr. W. Theobald makes the following remarks on the subject:—"Lays in the second week of May. Eggs, five in number, ovato-pyriform. Size, 2.53 by 1.51. Colour, pure white; when recently laid, pale green. Wuller Lake. Nest, a heap of weeds floating on the surface of the water, but connected to reeds, &c."

### *Tachybaptes fluviatilis* (Tunst.). *The Little Grebe.*

*Podiceps philippensis*, *Gmel., Jerd. B. Ind.* ii, p. 822.

*Podiceps minor*, *Linn., Hume, Rough Draft N. & E.* no. 975.

The Little Grebe is to be found all over the Empire, and there is scarcely any considerable-sized pond, tank, or lake in which it may not be seen during the cold weather, but during the breeding-season it leaves those which afford it no cover in the shape of rushes, reeds, and aquatic vegetation.

With us this species breeds at very different seasons, according to locality. In Cashmere they lay about the middle of May. Throughout the Upper Punjab and the Doab they chiefly lay in August and September. In Jhansi, July seems the favourite month; in the Nilghiris, May and June; and in the Shevaroys, August. The nests are sometimes fixed to the branches of some water-overhanging tree a couple of feet above the water, and are then made of twigs, grass, leaves, and weeds; but generally they are mere masses of weeds and rush, founded on some tuft of water-grass, and little, if at all, above the water-level. It is almost impossible to catch the old bird on the nest, and almost as difficult to surprise her so far as to make her leave the eggs uncovered. Almost invariably they are concealed by a layer of fresh wet weed. I doubt whether the birds sit much during the day, as I have watched a pair that had a nest, containing five (as it turned out) much-incubated eggs, nearly a whole day, and found that they never left the comparatively open water in which they were feeding, for the dense rush in which we found the nest next morning, for more than five minutes at a time. The birds certainly did not see me, as I was completely hidden and watching them through a pair of binoculars. I suspect that during the day the combined heat of the sun and the fermentation of the weeds is sufficient for incubation; and I have observed that some of the eggs (I presume those first laid) are always much more forward than others. Dr. Jerdon says they lay from five to eight eggs; but I have never seen or heard of any nest containing more than six eggs, and the number is almost invariably five.

Mr. Brooks writes:—"Got a nest, containing four eggs, of this bird near Etawah in a jheel on 9th September, 1867. The nest was a mass of weed and rush on a tuft of water-grass. The eggs, slightly glossy. Shell, firm and hard. Shape, an oval, somewhat pointed at both ends, though more so at one than the other. They were a mottled, stippled, dirty yellowish brown all over, the small end of one of the eggs a darker brown. They must of course have been white when first laid, and have become the colour they are (which is much like that of some addled Vulture's egg) from lying in the midst of wet decaying vegetable matter."

Mr. W. Theobald makes the following remarks on the nidification of this species in the Valley of Cashmere:—"Lays in the second week of May. Eggs, five in number. Shape, pointed oval. Size, 1·4 by 1·0. Colour, pure white. Wuller Lake. Nest, similar to that of *Podiceps cristatus*."

He further tells us that in the neighbourhood of Pind Dadan Khan and Katas in the Salt Range they "lay in August and September. Eggs, five. Shape, pointed oval to long ovato-pyri-form, measuring from 1·42 to 1·5 in length and 1·0 to 1·04 in breadth. Colour, pure white; when recently laid, green; is soon soiled brown in the nest. Nest, a few weeds heaped on the rank vegetation of jheels but floating, and usually several nests together."

Major C. T. Bingham writes:—"I found several nests in the early part of September in Reya-ka-tal, on tussocks of grass more than half immersed in water. There was no construction in the nests; they were merely little heaps of decayed rushes and grass, on which the eggs were laid. I found three nests with the eggs uncovered, the rest had a few of the rushes laid over the eggs. I have never found more than five eggs in a nest, more commonly four."

Mr. H. Wenden remarks:—"At Callian I found many nests between 29th August and 9th October, none of which contained more than four eggs.

"On 26th October at Goolburga Fort, 350 miles from Bombay, I found a nest containing five eggs. Having had good opportunities of observing, I can support Mr. Hume's opinion that freshly-laid eggs are not pure white, but are tinged with blue or green."

Colonel Butler makes the following remarks:—"I found numerous nests of the Little Grebe at Milana, near Deesa, in August 1876, dates of which are given below. The nest invariably consists of a round pincushion-like mass of weeds floating on the surface of the water, usually in beds of rushes or reeds, and the eggs are in most cases covered over with the same material. I have on two occasions only seen the old bird sitting on the nest, and when observed she immediately slipped silently off into the water and dived. When first laid the eggs, usually five in number, are pure white, but they so soon become discoloured that, unless taken within an hour or two after they are laid, they become a smoked *café-au-lait* colour, from the evaporation that takes place in the wet weeds with which they are covered.

" Aug. 21st. A nest containing 4 fresh eggs.

21st.	"	"	3	"
22nd.	"	"	3	"
22nd.	"	"	4	"
22nd.	"	"	5	"
22nd.	"	"	5	"
23rd.	"	"	5	"
23rd.	"	"	5	"
Sept. 13th.	"	"	5	"
13th.	"	"	5	"
Oct. 12th.	"	"	5	"
13th.	"	"	4 slightly incubated.	"

And writing from Belgaum he says:—"Breeds commonly about Belgaum. On the 21st July I took two nests containing two and one fresh egg respectively. On the 11th August found a nest containing four incubated eggs carefully covered over with damp sedge. 17th August, two nests containing three and four fresh eggs respectively. The shell, when held up to the light, if looked at through the hole, is dark green and the yolk is the deepest colour of any egg I know, almost, I should say, a deep orange.

"I don't think the egg, if left in the nest, ever remains white more than one day at the outside. I noticed two young broods on the last date, one of which was, I should say, at least a month old. On being approached the parent birds disappeared under water at once; the young ones, five in number, remaining on the surface all huddled together until I got quite close to them, when all of a sudden they scattered and disappeared with five simultaneous splashes, just as if a handful of pebbles had been thrown into the water. In a few seconds they rose, collected together, dispersed and disappeared again, and so on as long as I remained near. As soon as I left they collected together, and the parents rejoined them from the adjoining rushes."

Messrs. Davidson and Wenden, writing of the Deccan, remark:—"Common, and breeds in the rains."

Mr. Davison says:—"The Little Grebe breeds on the Ootacamund Lake in May and the earlier part of June in large numbers. The nest is either placed in the centre of a small clump of rushes, or attached to the outside; in either case it rests upon the water. When fresh, the eggs are pure white, but by the time they are ready to hatch off they are very dark, sometimes nearly black. This is owing to the habit the bird has of covering the eggs with wet leaves and rubbish every time it leaves the nest. It is amusing to watch the bird, as it sees a boat approaching, covering the eggs, and it is often not until the boat is only a few yards off that it plunges off the nest. The young appear to take to the water as soon as they are hatched, and often a little party of four or five may be come across (deserted by both parents), roving about hither and thither as if they did not know where to go or what to do, keeping up all the time a low monotonous chirrup. At this young age they appear to be incapable of diving; at least I have never seen them exercise this power. The normal number of eggs appears to be five."

Mr. A. G. R. Theobald remarks:—"I found a nest of this species on the 19th August at a lake opposite the Ahtoor station of the Shevaroy Hills. The nest was a large irregular platform, some 10 inches wide and nearly 2 feet long, fixed to the branches of a bushy tree growing at the water's edge. When I found it, the nest was nearly two feet above the water-level, but when constructed it may have been much nearer, as the lake had been recently a good deal higher. The nest was composed of grass, leaves, weed, and thin twigs, and contained five much-incubated eggs, which, when I found them, were completely covered with grass and leaves."

Mr. A. G. Cardew writes:—"The colony of these birds which Jerdon mentions is still in existence on the Ootacamund Lake, and breeds there, making the usual large nest of weeds and rushes. I have had it brought me with fresh eggs on the 30th July and early in August—*i. e.* just as the south-west monsoon terminates."

In Ceylon the Little Grebe, according to Colonel Legge, breeds during the south-west monsoon rains.

Mr. Oates, writing from Pegu, says:—"I took a nest with fresh eggs on the 25th July. It is a common bird throughout Pegu."

The eggs are moderately elongated ovals, much pointed at both ends, though rather more so at one end than the other. The texture is fairly close but slightly chalky, and they rarely have much gloss. When first laid they are white, faintly tinged with blue or green. In England the eggs are said to be pure white, but all those that I have seen in India have always, if quite fresh, exhibited a faint bluish-green tinge. Owing to the bird's habit of covering the eggs over with wet water-weeds, whenever it leaves them for a time, they become rapidly discoloured, turning green, dingy yellowish brown, and then dark earthy-brown, like a hard-set Shell-Ibis's egg.

In length they vary from 1.28 to 1.52, and in breadth from 0.77 to 1.1; but the average of forty eggs measured was 1.39 by 0.99.

## Order GALLINÆ.

### Family PHASIANIDÆ.

*Pavo cristatus*, Linn. *The Indian Peafowl.*

*Pavo cristatus*, Linn., *Jerd. B. Ind.* ii, p. 506; *Hume, Rough Draft N. & E.* no. 803.

The Common Peafowl is found in suitable localities throughout India wherever there is cover, natural or artificial, as of sugarcane and other dense crops, and a plentiful supply of water. Canal-banks fringed with trees and traversing rich cultivation are their especial delight, and in such localities I have found a great many nests, my search for them being stimulated by the conviction that a wild Peahen's eggs are delicious eating, far preferable to Turkey's or, indeed, any others that I have ever tried. They are not confined to the plains, but, alike in the Himalayas, Nilghiris, and other suitable ranges, breed up to elevations of from 3000 to 5000 feet.

The great majority lay during July and August, but I have found eggs as late as the middle of October. The nest is made in amongst thick grass or in dense bushes, often on a sloping bank, and is a broad depression scratched by the hen, and lined with a few leaves and twigs or a little grass. I have never myself found eggs in the abnormal situations described below by Mr. A. Anderson.

I have never found more than eight eggs in any nest, and I think that six or seven are the usual complement; but natives say (and see also Miss Cockburn's remarks) that they lay at times much larger numbers.

Colonel G. F. L. Marshall says :—“The Peafowl breed during the rains in the Saharunpoor, Bolundshahr, and Aligurh Districts. The eggs are laid on the ground, usually among the thick under-wood on the canal-banks.

“Near Bolundshahr I got six eggs on the 27th July ; the shell is much pitted, pure fawn-colour in some, and stained with darker brown in others.

“Again in the Aligurh District I found four fresh eggs on the 5th August ; they were laid on the bare ground, inside, but near the edge, of an old heap of dry sticks, round which grass had sprung up tall and thick ; this small thicket was in an open plain close to a road with no bushes or undergrowth near.

“But they sometimes breed later and choose more exposed situations even than this. On the 31st August I took three fresh eggs, laid without any attempt at concealment whatever : they were on the ground on a dry patch amongst very short grass under the trees on the canal-bank ; there was no undergrowth, and the eggs could be seen from some distance.”

Mr. R. M. Adam remarks :—“I had eggs of this species brought to me in Agra on the 14th October. The eggs were a good deal incubated.”

The late Mr. A. Anderson wrote to me that “the Peafowl breeds in the North-West Provinces, during June, July, and August, the latter being about the most general month. About November the young birds are the size of chickens, and are then well worth shooting for the table. Sometimes, though rarely, I have seen ten and twelve chicks following one hen ; but these, no doubt, are amalgamated broods, for I have never found more than six eggs in one nest (I believe, however, that they occasionally lay up to seven or eight), and sometimes only three or four.

“Three years ago, a chuprassy, who, from long practice, had become somewhat arboreal in his habits, brought me three fresh Peafowl’s eggs from an old nest of *Gyps bengalensis*. Shortly afterwards I saw the nest, which was situated on a huge horizontal bough of a burgot, in the centre of some dhâk jungle, and on which all the Peafowl in the neighbourhood were in the habit of roosting. I have every reason to believe my chuprassy, because he had no object in wishing to deceive me, and my own experience is in favour of these birds laying at high elevations (the same remark is applicable to a good many gallinaceous birds), for I have on several occasions taken their eggs from the roofs of huts in deserted villages, high mounds, and from the tops of *pucka musjids*, on which rank vegetation grew to the height of two or three feet.”

Professor Littledale, writing from Baroda, says :—“The Peahen generally nests on the ground. Here the country is very flat, and gets so flooded that trees are used. I found, on the 30th September, 1884, a nest and five eggs, hard-set, in a triple fork of a mango-tree 12 feet from ground.”

Colonel Butler writes :—“The Peahen lays in the neighbourhood of Deesa in July, August, and September. The nest consists of a

hole scratched in the ground under a bush or tussock of high grass, sometimes under shady trees quite exposed. The eggs are generally of a creamy-white colour, and vary in number from 4 to 7. The hen bird sits very close, and when disturbed leaves the nest usually very reluctantly, walking slowly away with drooping wings, the feathers of the neck raised, and uttering her peculiar trumpet-like call."

From the Nilghiris Miss Cockburn writes:—"The Peahen lays from ten to fifteen eggs, and forms a nest by scratching a slight place in the ground and gathering a few dry leaves and sticks. The eggs are generally found in June and July, and are a dingy buffy white."

Colonel McInroy found the nest of the Peafowl in Mysore on the 25th April.

In Ceylon, according to Colonel Legge, the Peafowl breeds from January to April.

The eggs are typical Rasoial ones, much like gigantic Guinea-fowl's eggs, with thick, very strong and glossy shells, closely pitted over their whole surface with minute pores, which are, however, more deeply indented and more conspicuous in some specimens than others. In shape they vary much—some are very broad, some decidedly elongated, ovals, so that some more resemble in shape an English Pheasant's egg, and others are more like a Turkey's: all are more or less pointed towards the small end. The colour, within certain limits, also varies much: some are almost pure white, others are a rich *café-au-lait* or reddish buff; others again are dingy yellowish buff, but typically they are a pale pinkish *café-au-lait* colour. Occasionally specimens are met with thickly freckled with pale reddish brown, feeble reproductions of the Moonal's eggs; but the vast majority are entirely unspotted.

In length they vary from 2·55 to 3·0, and in breadth from 1·92 to 2·2; but the average of forty eggs is 2·74 by 2·05.

### *Lophophorus impeyanus* (Lath.). *The Moonal.*

*Lophophorus impeyanus* (Lath.), *Jerd. B. Ind.* ii, p. 510; *Hume Rough Draft N. & E.* no. 804.

The Moonal breeds throughout the forest-clad ranges of the Himalayas, at any rate from Cashmere to Bhootan, at elevations of from 7000 or 8000 to fully 12,000 feet.

The breeding-season is in May and June. They have only one brood, and the female alone incubates the eggs and rears the young.

Usually, the eggs are laid in a bare depression in the ground, scratched by the female, under the shelter of some overhanging rock, the massive root of some large tree, or some thick tuft of fern, but at times the hollow is more or less lined with dry grass, dead leaves, or a little moss.

In localities where they are very numerous, *e. g.*, on the "Chor"

not far from Simla, several nests may be found within a circle of a hundred yards, as if the females were, even at this season (as they are at all others), more or less gregarious.

Six is the largest number of eggs that I have known to be found in any one nest, and four or five is certainly the usual number; but native sportsmen talk of finding occasionally as many as a dozen.

Long ago my friend Mr. Frederic Wilson, the well-known 'Mountaineer,' remarked :—“The female makes her nest under a small overhanging bush or tuft of grass, and lays five eggs of a dull white, speckled with reddish brown. The chicks are hatched about the end of May.”

He now writes to me from Gurhwal :—

“The Moonal breeds at elevations from 8000 to 12,000 feet in all sorts of forest. Some begin to lay early in May, others not till the end of the month. The nest is placed in much the same situations as that of the Koklass—that is to say, always under some slight shelter, an overhanging bush or tuft of grass, or rock or stone, or in the hollow at the foot of a tree, or under an old trunk. It is merely a hole scraped in the ground; but bits of grass, leaves, &c., which are round it, are often dropped in, and, with some feathers from the bird, form a sort of lining. Nothing is brought in to make a nest either by the Moonal or, I think, any others of our Hill game-birds. I have generally found five eggs in a nest, sometimes only two or three, but never more than five. In a small work which I lately read, ‘Five weeks in the Himalayas,’ by Captain Matthias, the author mentions finding a Moonal’s nest with nine eggs; but I fancy he must have mistaken the nest of a Koklass for that of a Moonal. The eggs are about 2·75 long and 1·75 wide, buffish white, powdered with chocolate and in some with spots and blotches of same colour. If the eggs are hatched under a domestic fowl, the chicks take readily to the foster mother, but often seem at a loss how to get on with her. The young broods in the forest are generally found with the hen-bird only. Indeed, I doubt if the Moonal *pairs* at all. Where they are rare, they may do so; but where numerous, I think not. For a couple of months the chicks are alike in colour, and then the males begin to change slightly. At four months they are easily distinguishable, though they get none of the bright feathers till the second moult. Then they get the full plumage of the male bird, with the exception of the seventh long feather of the wing, which keeps the brown colour of the hen till the third moult.”

Writing from Dhurmsala, the late Major Cock said :—“The Moonal breeds in May and June, and lays from five to eight eggs in a hollow on the ground, either under some rock or fallen tree, or a thick rhododendron bush. The eggs vary in colour, but not in shape—some being spotted with broad spots, and others speckled with fine specks. The eggs are very like those of the Turkey. The nidification of this bird depends much on the year. In mild winters, when the snow is off the ground, they begin earlier. No

nest to speak of is made, but a few feathers are sometimes found about the eggs."

Captain Hutton writes:—"These birds do not occur so low down as Mussoorie, but are found in abundance on the next range. In days of yore they were found at Simla, but civilization has of late years banished them to less disturbed localities. It makes no nest, but lays its eggs on the ground; the number not satisfactorily ascertained, as one nest contained three, and another four, eggs of a pale brown or sandy hue, thickly sprinkled over with reddish-brown spots and dashes."

The eggs in shape and size closely approximate to those of our domestic Indian Turkey, but are as a whole slightly larger, and, considering how much heavier the latter bird is than the former, this difference in the egg is remarkable. The shell is fine and compact, showing none of the pores so conspicuous on Peafowl's eggs; but they have only a faint gloss, and contrast in this respect strongly with the eggs that our domesticated Turkeys here commonly lay. The shape is a long oval, a good deal compressed towards the small end. The ground-colour is a pale *café-au-lait* or buffy white, and they are thickly and coarsely freckled all over, but most thickly over the central portion of the egg, with deep reddish brown, which has a sort of raw sienna tint. The markings are sometimes nearly wanting towards the small end, and are always, I think, least conspicuous and least dense at the two ends. Sometimes the whole egg is densely mottled all over with the reddish brown; sometimes, again, the markings are almost wholly wanting; and in some they are gathered into large and comparatively bold blotches.

In length the eggs vary from 2.41 to 2.69, and in width from 1.7 to 1.89; but the average of thirty-six eggs is 2.55 by 1.78.

*Ceriornis satyra* (Linn.). *The Indian Crimson Tragopan.*

*Ceriornis satyra* (Linn.), *Jerd. B. Ind.* ii, p. 516; *Hume, Rough Draft N. & E.* no. 805.

The Crimson Tragopan breeds high up, at elevations of from 9000 to 12,000 feet, in the forests that lie below the snow, or in dense patches of the hill-bamboo; but I have never found the eggs myself, and my account is based on the statement of natives, from whom I received the only eggs I possess, which latter were taken in Kumaon in May.

The eggs are much like large hen's eggs, perhaps rather more elongated and more compressed towards the small end. The shell is only moderately stout, and the surface is conspicuously pitted over with pores. In colour they are nearly white, having only a faint *café-au-lait* colour, and they are here and there very slightly freckled with a pale dull lilac. One egg is somewhat darker and entirely wants these markings. They have very little gloss. In length they vary from 2.54 to 2.62, and in breadth from 1.8 to 1.84.

*Ceriornis melanocephalus* (Gray). *The Western Tragopan.*

*Ceriornis melanocephala* (Gray), *Jerd. B. Ind.* ii, p. 517; *Hume, Rough Draft N. & E.* no. 806.

The only eggs of the Western Tragopan that I have yet seen are six sent to me by Captain Unwin from Hazara, and which were taken on the 25th May, 1869, by Captain Lautour, who communicated to him the following note:—

“ I was shooting on a range of hills from 8000 to 11,000 feet high. The Argus in parts very plentiful, the hills covered with pine-forests; and the Argus I used to find about one fourth of the height of the hill from the top, and they appeared to affect the vicinity and edges of snow nullahs and landslips, where there was a fair quantity of undergrowth and where there were plenty of rocks.

“ At the time of finding the nest I was on the lookout for Pheasants, but the ground being rather stiff I had just given up my gun to the shikaree, when the bird got up almost at my feet. I was going through a pine-forest, and had reached a place where an avalanche or landslip had carried away all the pine-trees, and in their place small bushes and shrubs resembling the hazel had sprung up. I was descending into this when the bird got up, as I said before, almost at my feet. The nest was on the ground, and was very roughly formed of grass, small sticks, and a very few feathers; it was very carelessly built. More I did not observe, as the bird having gone down close, I wanted to shoot it.

“ I did not succeed in doing this, but from the close view I had of it and the attention I have since paid to all our Pheasants, I have no doubt the bird was a hen Argus.”

Indian sportsmen always miscall this species and the previous one the Argus. I may add that there is no earthly doubt of the correctness of the identification, as there is absolutely no other bird in the Western Himalayas that could have laid these eggs.

The eggs are more or less elongated ovals, considerably compressed towards the small end. They are, as a whole, of very much the same length, but a good deal slenderer than the eggs of the Moonal. The shell is fine, but almost absolutely devoid of gloss. Looked at from a little distance, they appear to be of a uniform colour and devoid of markings, and seem to vary from a pale *café-au-lait* to a dull reddish buff; looked into closely they appear to have a somewhat lighter ground-colour, excessively finely and minutely freckled and spotted with a somewhat darker shade. They are the least glossy of all the true game-birds' eggs that I know, and in shape and texture, though not in tint, remind one not a little of those of the King Curlew and White Ibis and other birds of that family.

In length they vary from 2·4 to 2·55, and in breadth from 1·68 to 1·72; but the average of the six eggs is 2·51 by 1·7.

**Pucrasia macrolopha (Less.). The Koklass.**

*Pucrasia macrolopha (Less.),* *Jerd. B. Ind.* ii, p. 524; *Hume, Rough Draft N. & E.* no. 808.

The Koklass, or, as some sportsmen call it, the Pukras, breeds throughout the Himalayas from Cashmere to Bhootan in all well-wooded localities, at elevations of from 6000 to 9000 feet. The bird itself may be shot at any elevation from 3000 to 11,000 feet; but it only nests, according to my experience, between the limits I have indicated. The breeding-season lasts from the middle of April until the middle of June, according to locality and season, but the majority lay, in normal seasons, during the first half of May.

Little or no nest is made; a circular depression is scratched in the ground, in a thick shelter of undergrowth or under some huge root or overhanging rock, and in this unlined, or but sparingly lined with leaves, moss, or dry grass, or all three, the eggs, from five to nine in number, are laid.

Mr. Wilson, quoted by Dr. Jerdon, remarked, some twenty years ago, that "the female lays seven eggs nearly resembling those of the Moonal in colour. They are hatched about the middle or end of May. She makes her nest under the shelter of an overhanging tuft of grass, or in a corner at the foot of a tree, and sometimes in the hollow of a decayed trunk."

Now writing to me from Gurhwal, he says:—"The Koklass breeds at elevations of from 5000 to 10,000 or 11,000 feet, in coppices and forests with some underwood. The nest is a hole scraped in the ground, and always sheltered under a tuft of grass or thick bush or overhanging stone, and it is sometimes made in the hollow at the foot of a big tree or old trunk. As a rule, the number of eggs seems to be nine. It begins to lay early in May, but some not till the end of the month. The eggs are sharp-pointed, say about 2·25 long by 1·5 wide, yellowish or dirty white, powdered and spotted and blotched with chocolate. Both birds are generally found with the young brood. The male chicks of this and the Kalij get their proper plumage the first year. By the middle of September they are pretty well grown."

The eggs are oval, more or less pointed towards the small end, and vary a good deal in size and shape, as in the case of the Peafowl, some being much broader and others more elongated ovals. None that I have seen have been at all of the ovoido-conoidal shape of the Francolins and the Common Pheasant (*P. colchicus*). The shape is more that of the true Partridge, *Galloperdix* and *Gallophasian*. The ground-colour is a rich pale buff, and the eggs are, some densely and thickly speckled and spotted, and others boldly but thinly blotched and spotted, with deep brownish red, which is dullest in the speckled, and brightest and deepest in the blotched varieties.

The eggs of these two types vary more in appearance than might perhaps be supposed from the above description. One egg will

have the whole ground as thickly speckled over as possible with minute dots, not one of them much bigger than a pin's point, and so closely set that a pin's head could nowhere be placed between them ; while another egg will have at most a dozen bold blotches, and three or four times that number of good-sized spots, leaving comparatively large spaces of ground-colour utterly unspotted. It is impossible to conceive a richer brownish red than that displayed in some of these blotches, and eggs of this species of the boldly-coloured type are, I think, the handsomest of all our Indian game-bird's eggs. Taken as a body, they are very like miniature Moonal eggs, and they also remind one much of those of the European Black Grouse.

The eggs vary very much in size, viz., from 1.85 to 2.29 in length and from 1.39 to 1.57 in breadth ; but the average of fifty eggs is 2.08 by 1.47.

*Phasianus wallichii* (Hardw.). *The Cheer.*

*Phasianus wallichii* (Hardw.), *Jerd. B. Ind.* ii, p. 530; *Hume, Rough Draft N. & E.* no. 809.

The Cheer breeds throughout the lower ranges of the Himalayas, at elevations of from 4000 to 7000 or 8000 feet. They also breed from April to June, most of the eggs being laid during May, early or late in the month according as the season is a cold or warm one. Personally I have only taken three nests of this species altogether, so that I cannot generalize safely ; but my impression, derived from my limited experience, is that they always nest near or about the foot of some very precipitous hill-side, what the natives call "Dang" cliffs, not absolutely vertical but still the next thing to it, broken up into ledges and steps, and studded with down-trailing bushes, tufts or grass, and, growing here and there out of some larger cleft or wider ledge, a few stunted trees.

In 1853 I was living at a small house behind the "Camel's Back" at Mussoorie, a house which was afterwards converted into a dispensary. About a thousand feet below and perhaps half a mile from this is a precipice, such as I have described, and at the foot of this, in the midst of a tuft of grass, I found on the 3rd May a nest of the Cheer containing two eggs. It was a mere depression, some 14 inches in diameter and 3 inches in depth in the centre, obviously scratched by the birds and strewed, rather than lined, with a few scraps of grass. Eleven more eggs were laid, one daily, and then the hen began to sit. One egg was addled ; the rest were hatched somewhere about the beginning of June, but I kept no note of the date. The whole family then took up its residence in the precipice, and there remained until the middle of October, when, the young being nearly full-grown, I commenced shooting them and shot a brace once or twice a week, until there were only two, or three young ones left. At 11 A.M. they were always in the upper part of the precipice ; my dogs used to be put

in, and would rummage along the ledges and turn them out, when, after a few strong strokes outwards from the face of the cliff, they would all but close their wings and come down past me (I always stood in the same place on a knoll at the foot of the cliff where I was safe from stones) like lightning. I remember well missing every single shot the first day, but the next time I got a brace and after that I never went home without one or two, and, strange to say, my weekly and sometimes bi-weekly visits never had the effect of driving them away, and, what is more, in October 1860, when I again visited the place, I found my friends in their old locality, and got three brace then and there.

I found another nest with several eggs late in May, in a very similar situation, on Nagtiber, at, I suppose, an elevation of about 6000 feet; and a third, containing four eggs, which I took early in May, a few miles from Juggutsook, in the upper valley of the Beas. This, too, was similarly situated.

Mr. Wilson, quoted by Dr. Jerdon, tells us that "the female makes her nest in the grass or amongst low bushes, and lays from nine to fourteen eggs of a dull white, and rather small for so large a bird. They are hatched about the end of May or beginning of June. Both male and female keep with the young brood and seem very solicitous for their welfare."

The eggs are, as remarked by 'Mountaineer,' very small for the size of the bird. They are of a very pale stone-colour or a dingy, slightly *café-au-lait* tinted white. They are almost devoid of markings, but towards one or other end many specimens exhibit small somewhat pale brownish-red specks and spots; and one or two that I have seen have had a good number of very minute specks of the same colour scattered about the surface. They altogether want the warm *café-au-lait* tint of those of the Moonal, Koklass, and the Kalij, and laid beside these eggs they seem to have a slightly greenish tint. In shape they resemble an ordinary hen's egg, and are not at all, as might have been expected, like those of *P. colchicus*. The shell has a slight gloss, but it exhibits throughout the minute pits or pores so characteristic of Rasorial eggs, in a much less degree no doubt than those of the Peacock and others, but in a greater degree than those of the Koklass.

They appear very uniform in size; at any rate the specimens I have only vary from 2.05 to 2.22 in length, and from 1.47 to 1.56 in breadth.

*Euplocamus albocristatus* (Vig.). *The White-crested Kalij.*

*Gallophasian albocristatus* (Vig.), *Jerd. B. Ind.* ii, p. 532; *Hume, Rough Draft N. & E.* no. 810.

The White-crested Kalij breeds everywhere in the Himalayas south of the first Snowy Ranges (and occasionally in the Dhoons and Terais that fringe their bases), from the borders of Afghanistan to Nepal.

I have found eggs in the Dhoon as early as the 4th April, and at Simla as late as the 20th June. They breed at all elevations, from the level of the Terai (where it may be 1200 feet above the sea-level) up to fully 8000 feet.

They are not very particular as to choice of locality, but more or less inhabited and thinly forest-clad tracts, with pretty dense undergrowth, are usually chosen; little, densely bushed water-courses on the sides of hills, moderately thickly or somewhat thinly covered with oak and rhododendron forest, and in the neighbourhood of fields, being much affected.

The Common Kalij hardly forms a regular nest. It gets together a pad, sometimes rather massive, sometimes very slight, of fine grass and coarse moss-roots, mingled with a little grass or a few sprigs of moss, and in a slight depression in the centre of this it lays its egg. One which I measured *in situ* in May 1871, in the valley of the Sutlej just below Kotegurh, was circular, 11.5 in diameter and 4 inches in thickness outside, with a central depression 6 inches wide and nearly 2 inches in depth in the centre. Others, again, have been mere linings to a slight hollow in the ground, either natural or scratched by the birds; I have seen a great many nests of this species, and they were generally very scanty. The nest is usually well concealed under tufts of fern (they are very fond of fern-clad hill-sides), grass, or "ringall" as the natives call the slender dwarf hill-bamboos.

I have never found more than nine eggs myself, but I have had as many as thirteen brought me by natives, said to have been found in one nest. As a rule, I do not think they lay more than nine eggs, and certainly one rarely sees more than eight or nine young birds with a pair of old ones.

Dr. Jerdon says that "the Kalij lays from nine to fourteen eggs, very similar in size and colour to those of the domestic hen. They are hatched about the end of May."

From Gurhwal Mr. Frederic Wilson writes to me:—"The Kalij Pheasant (*murghi* or *kookera* of the Paharis) is found from the foot of the hills, or rather from the Sewalik Range, to the Snows, and consequently breeds at all elevations up to 9000 feet, in a few localities still higher; I lately found the nest above the village of Sookee in the Bhagiruttee Valley, which must have been at 9500 feet. In the Dhoon, at the foot of the hills and in the lower valleys, the Kalij begins to lay in April. In the higher ranges it lays in May, and some birds not till the beginning or middle of June. The nest, if it can be called such, is generally in a coppice where there is plenty of underwood, and under an overhanging stone, or thick low bush, or tuft of grass. It is merely a hole scraped in the ground. The eggs are nine to fourteen in number, very like those of some domestic fowls, a yellowish or buffy white. One I have before me is 2 inches long and 1.5 wide. Some are rounder, one from another nest is 2.0 long and 1.62 wide. Both parent birds are generally found with the young brood. Occasionally very late broods would lead one to infer, either that the Kalij sometimes has

two broods in the year, or that when a nest is destroyed they commence the business of incubation over again."

Captain Hutton remarks:—"This species, the Kalij of the hill-men, is found in the hills at all seasons, and is common at every elevation up to the snows. It breeds in May and June. In the latter month I found a nest, by the side of a small watercourse, composed merely of a few dead leaves and some dry grasses, which had probably been accumulated by the wind and tempted the bird to deposit her eggs upon them. The spot was concealed by large overhanging ferns, and contained the shells of eight eggs, of a sullied or faint brownish white, like some hen's eggs; the tops of all were neatly cut off as if by a knife, showing that the young ones had escaped, and, singular enough, I had the day before captured the whole brood."

The late Major Cock said:—"The Common Kalij breeds in May and June, and lays its eggs as a rule on the ground under a rock or bush; but I have taken a nest on a large low bough of a tree, in a hollow on the upper side of which the eggs were placed. The hen will allow herself to be caught on her nest at times. Lays eight eggs, of a buff colour."

The eggs are oval, moderately elongated, a good deal pointed towards one end, perhaps, typically, less so than those of the Grey Partridge, more so than those of the Peahen, but belonging to that type, and not to that of the Francolin's or English Pheasant's. The eggs are always glossy, sometimes highly so, and the surface is generally very finely and closely pitted with minute pores like those of the Peacock's egg on a diminutive scale. In some specimens these are pretty conspicuous, but in the majority they are only noticeable on close inspection, and in some they appear almost entirely wanting. The eggs vary in colour from a very pale creamy or buffy white to a rich reddish buff, even richer and redder than any specimens of the Peafowl's eggs that I have yet seen; though such may doubtless occur, I have not yet seen a specimen freckled or mottled as Peafowls' eggs occasionally are, though I have seen some pretty thickly speckled with minute white spots.

In length the eggs vary from 1.85 to 2.03, and in breadth from 1.25 to 1.52; but the average of fifty eggs is 1.94 by 1.44.

*Euplocamus melanotus*, Blyth. *The Black-backed Kalij.*

*Gallophasis melanotus* (*Bl.*), *Jerd. B. Ind.* ii, p. 534; *Hume, Rough Draft N. & E.* no. 811.

The breeding-season of the Black-backed Kalij lasts for several months. Quite low down, at elevations of 2000 feet or so, they lay as early as the end of March; at 4000 or 5000 feet, eggs may be looked for about the middle of May, and towards the higher limits, 6000 or 7000 feet, they lay in June; and eggs, much incubated it is true, have been found as late as the end of July.

They never seem to make a nest; at any rate, of the dozen odd

clutches reported to me, none were found in any constructed nest ; three were found in little clumps of grass at the feet of tea-bushes, and the rest amidst dead leaves and moss, a little scratched away, under the cover of bushes or tufts of ferns, or at the base of over-hanging rocks.

Ten seems to be the full number of eggs ; at least this is the largest clutch reported to me.

Dr. Jerdon states that "its eggs are occasionally found by the coolies when weeding the tea-gardens (near Darjeeling) in June and July, and are usually, I am told, five to eight in number."

A nest obtained near Darjeeling in July contained six eggs of the usual Kalij type, that is to say, broad regular ovals, but little compressed towards the small end, of a decided *café-au-lait* tinge. The shell strong and hard ; the surface everywhere covered with minute pits, but withal fairly glossy.

The eggs are of course of the regular game-fowl type, varying very much in size and shape (some being much broader, others more oval), as also in tint. They ring the changes from pale pinky creamy and pale *café-au-lait* to a rich *café* with a little milk in it.

The eggs vary from 1.79 to 2 inches in length, and from 1.4 to 1.54 in breadth ; but the average of a large series is 1.91 by 1.47.

*Euplocamus horsfieldi*, G. R. Gray. *The Black-breasted Kalij.*

*Euplocamus horsfieldi*, G. R. Gr., *Hume, Cat.* no. 810 ter.

This species lays mostly in April and May, but nests may be found towards the close of March and well into June.

My friend Mr. Cripps found a nest on the 29th March, 1875, in Sylhet, and caught the female sitting on it. "The nest," he says, "was composed of a heap of dry leaves, a foot in diameter and about six inches in height ; the egg-cavity was 5 by 4 ; no lining ; the eggs were four in number and perfectly fresh ; the site chosen was at the foot of a large tree standing on a piece of flat land between two hillocks."

He found another nest on the 22nd March, 1879, with two fresh eggs, at Khowang in Assam.

The eggs are of the usual Kalij type, very regular, rather broad ovals, with rather strong and coarse shells, very conspicuously pitted all over with minute pores and with a faint gloss. In colour they vary from pale buff to a warm rich *café-au-lait*.

In length the few eggs I possess vary from 1.8 to 1.9 and in breadth from 1.45 to 1.5.

*Euplocamus lineatus* (Lath.). *The Burmese Lineated Pheasant.*

*Euplocamus lineatus* (Lath.), *Hume, Rough Draft N. & E.* no. 809 ter; *id. Cat.* no. 811 ter.

Mr. Oates has sent me the following note in regard to the nidi-

fication of the Lineated Pheasant in the country between Thayetmyo and Tonghoo in Burma :—

“ The breeding-season begins about the 1st March, and by the end of the month all the hens have commenced laying.

“ The female makes no nest, but chooses a hollow on a bank-side, generally at the foot of a bamboo-clump. The dead leaves, which have accumulated to the depth of three or four inches, are hollowed out by the bird, not purposely I think, but merely by the pressure of the bird's body. The first nest I found in 1871 contained six fresh eggs : this was on the 24th March. The second nest, found on the 8th April, contained seven eggs slightly incubated. The extreme dimensions of fifteen eggs were 1.75 to 1.95 in length and 1.4 to 1.5 in breadth.

“ A third nest, found on the 15th April, 1873, contained seven eggs hard-set.”

Major Bingham found a nest in Tenasserim with seven eggs on the 16th March. The nest was a small hollow that had been scratched in the ground and was lined with leaves and a few feathers.

The eggs are of the ordinary hen's egg type. They have a rather fine shell (the pores, however, being very numerous), but scarcely any perceptible gloss. They have no markings or spottings, but are of a uniform, rather rich, *café-au-luit* colour.

**Gallus ferrugineus (Gmel.). The Red Jungle-fowl.**

*Gallus ferrugineus, Gm.,* *Jerd. B. Ind. ii, p. 536;* *Hume, Rough Draft N. & E. no. 812.*

The Red Jungle-fowl is, as its name imports, a true denizen of the jungle, and most especially of jungle in the vicinity of scattered cultivation, at or near the bases of hills, which keep it comparatively well watered throughout the year.

It breeds within our limits in suitable localities throughout Burma, Assam, Bengal, Oudh, the North-West Provinces, and the eastern portion of the Punjab, although in this latter locality it is much rarer than in the other provinces above named. In the Central Provinces it is only found in the northern and eastern portions. It is common in the Kymore Range and extends on to the Maikle or Ammurkuntuk Ranges. It is the only Jungle-fowl in Sumbulpoor, Raipore, Balaghât, Mandlah, and Jubbulpoor. I have been unable to ascertain which Jungle-fowl occurs in the hills about Seoni, Kooraie, Deoghur, and Chundwara, but I suspect that the Kunhun Valley here divides the two species. In Bustair and Puchmurree both it and the next species meet. In Madras it occurs on the Eastern Ghâts in Ganjam and Vizagapatam ; in fact, as far south as the Godavery.

It is not confined to the plains ; in summer at any rate it is to be found at elevations of from 3000 to 4000 feet in the hills, about whose bases it is most commonly found in winter. It breeds

both in the low country and in the hills, laying, according to my experience, from April to June.

The hen makes her nest in any dense thicket—bamboo-clumps, it is said, by preference, though I have not noticed this to be the case,—composed of dry leaves, grass, and stems of soft herbaceous plants. Sometimes the nest is large and comfortable; sometimes it looks as if the bird had made no nest, and merely laid on a heap of dry leavess that it found handy, hollowing a receptacle for the eggs by the pressure of its body. Sometimes, again, the bird has clearly scraped a hollow in which to place the nest; and sometimes it has scraped up the earth all round, so as to make a sort of rim to the nest and keep the materials firm.

Many years ago, shooting in May for a month along the southern side, chiefly, of the Sewaliks, my people and dogs between them used to find me a nest almost every day, and once we found six within a circle of 200 yards near the Bhinj-ka-khol. A large *lota* of water was carried, and one or two eggs out of every batch were tested to see if they would lie flat at the bottom, stand on end, or float; of course we took only the former, and these I used to eat boiled and in omelettes, until I got perfectly sick of them. In those days (I say it with pain and humiliation) the only use I ever put eggs to was to eat them; and in this particular case I was punished, for since I took to collecting eggs, fate has so willed it that I have never seen a single nest, and have only quite recently succeeded in obtaining a very few from different localities. Well, in all the many nests I have seen I never found more than nine eggs, and, as well as I can remember, five or six were the usual complement, even where the eggs were hard-set and floated.

Captain Hutton says:—"The Common Jungle-fowl is abundant in some parts of the Dhoon, and in summer ascends the outer hills to 5000 feet elevation. It lays its eggs on the ground with little preparation of nest, contenting itself with scraping together a few dry leaves and grass; the eggs being from four to six generally, though often more, of a dull white and very similar to those of common Bantam Fowls, with which it will readily breed if domesticated from the egg."

"I have often reared the chicks under a domestic hen and turned them loose, but after staying about the house for several days they always eventually betook themselves to the jungles and disappeared. If kept confined with other fowls, however, they readily interbreed, and the broods will then remain quiet under domestication, and always exhibit both in plumage and manner much more of the wild than of the tame stock, preferring at night to roost on the branches of trees. Mr. Blyth has remarked that his cross-bred eggs never produced chicks, but I have never found any difficulty in this respect. The crowing of the cock birds is very shrill and like that of the Frizzled Bantams. In the wild state it is monogamous."

Dr. Jerdon states that "the hen breeds from January to July, according to the locality, laying eight to twelve eggs, of a creamy-white colour, often under a bamboo clump or in some dense thicket,

occasionally scraping a few leaves or a little dry grass together to form a nest."

In the 'Field,' 'Ornithognomon' writes :—" The period of incubation varies according to locality, but is generally at the beginning of the rains, *i. e.* June. I have seen eggs, however, in March. She selects for the purpose of nidification some secret thicket in the most retired and dense part of the jungle, scraping together a few leaves on the ground by way of nest. She remains as part of the cock's seraglio until some seven to ten or a dozen eggs have been deposited in the above spot, to which she stealthily repairs every day, and finally quits her party and retires alone and unseen to perform the duties of incubation. The chicks are hatched as usual in about twenty days, and run about, following the mother, as soon as they have emerged from the egg-shell ; and she leads them about, teaching them how to find their own sustenance, till they are big enough to shift for themselves, by which time the young cocks, finding that they cannot in honour come within a few yards of each other without a battle, separate, each one taking some of his sisters with him. These particulars I have gathered from native informants ; but I can add from my own experience that either the season of incubation is uncertain, or that the hens lay in the cold season with no more ulterior views than the domestic birds, for both in February and March I have heard them emit that peculiar cackle *tuk-tuk-tuk-tuk-tukauk*, by which every one knows a hen in a farmyard proclaims to the good housewife a fresh acquisition to her larder."

A good deal of this is purely "native." In the *first* place, the nests are not really generally so very carefully hidden ; they are in thickets no doubt, but fully half of them are so far open that no one given to bird-nesting could possibly pass them. In the *second*, go near the nest when you like,—morning, noon, or evening,—be there one egg or six in the nest, your dogs are certain to put the hen up quite close. In the *third* place, how each young cock is to go away taking *some* of his sisters with him I do not know. Certainly to judge from the young birds one kills in October and November (when they are as fat as butter and most delicious), fully as many young cocks as hens are reared. Lastly, I am quite certain that they are not always polygamous. I do not agree with Hutton that they are monogamous, because I have constantly found several hens in company with a single cock ; but I have also repeatedly shot pairs without finding a single other hen in the neighbourhood, and if you have good dogs (and you can do nothing in jungle with either these or Pheasants *without* dogs) you are sure to *see* and *hear*, even if you get no shot at them, all the birds there are.

Major Wardlaw Ramsay writes :—" I took eleven eggs from a nest in Karen-nee on the 14th March. The eggs were simply laid in a small hollow scratched out by the bird under a fallen branch."

Major Bingham, writing from Tenasserim, says :—" In the Zinzaway reserve, near the Yonzaleen river, I found several nests with

eggs of Jungle-fowl, but as I was hard up for provisions I generally ate them. I preserved, however, four which I send you; they were found on the 13th April in a scratched-out pan of a nest in thick bamboo-jungle."

From Upper Pegu, where they are quite as common in the hills as in the plains, Mr. Oates sent me eggs taken by him on the 20th March and 25th May. He says:—"In Pegu this species appears to breed throughout the first six months of the year, but more frequently in April, May, and June. Nests at all elevations from 100 to 2000 feet above sea-level."

The eggs vary a good deal in size and shape, but typically they are miniature hen's eggs; considerably elongated varieties are, however, common. The shell is, as a rule, very fine and smooth, and has a tolerable gloss, but specimens occur in which the pores are much more marked than usual, the shell coarser and rougher, and the gloss very faint. As to colour they are normally a pale yellowish *café-au-lait* colour, but occasionally a redder and deeper-coloured egg is met with.

In length the eggs vary from 1.6 to 2.03 and in breadth from 1.27 to 1.5; but the average of thirty eggs is 1.78 by 1.36.

*Gallus sonneratii*, Temm. *The Grey Jungle-fowl.*

*Gallus sonneratii*, Temm., *Jerd. B. Ind.* ii, p. 539; *Hume, Rough Draft N. & E.* no. 813.

The Grey Jungle-fowl is found and breeds throughout the peninsula of India in suitable localities, extending northwards in the Central Provinces to Puchmurree, being the only Jungle-fowl of the Satpooras, and on the west reaching as far north as Mount Aboo and Serohi. It does not, that I could discover, extend further up the Aravallis than this latter locality. It ascends the Nilghiris to 5000 feet, and Aboo as high as the Oonja or Jawi Plateaux, or say about 4800 feet. Two eggs were taken in May when I was at Aboo, but as to the breeding-season and other particulars I must let my correspondents speak.

Writing from Aboo, Dr. King noted that "the eggs were found here from the middle of April to the end of May. The nest was described by the Bheels and shikarees (for I never went down to take one myself) as similar to that of the Spur-fowl (*G. spadiceus*), but larger, and like it placed in clumps of bamboo or other thick undergrowth."

Mr. J. Davidson says:—"I found it breeding in Satara in March and April, but in Mysore in July."

Mr. McInroy writes:—"I have seen chicks of about a week old, both in April and November, within a few miles of Hünsür (S.W. Mysore)."

Colonel Butler remarks:—"Although I have never seen the nest myself, still having had both the eggs and young brought to me on several occasions, I can speak from very reliable experience. At

Mahableshwur, where the bird is not uncommon, I have often caught the little chicks in the hot whether, and coolies that I have employed as beaters used constantly to find the eggs when I was out shooting.

"At Mount Aboo, though somewhat scarce now on the top of the hill, it is very plentiful in the jungles on the side of, and at the foot of, the hill. It begins to lay at the end of March, and I fancy lays through April and May, after which the fine wild crow of the old cock ceases.

"I have never heard of its breeding at any other season at either of the places I have mentioned.

"All of the eggs that I have seen have been of the type you describe, namely long ovals with a slight gloss, of a pale creamy-white colour, and very like small hen's eggs."

Writing from Kotaghery in the Nilghiris, Miss Cockburn remarks:—"The hen forms her nest in woods on the ground, gathering a few dry leaves and sticks about her. The number of eggs found in a nest is from seven to thirteen. They are of a dirty white or buff colour. The hen, when leaving the nest to seek food, generally covers the eggs with dry leaves, no doubt hoping by so doing to screen them from harm. These nests are found during March and April. I have on two or three occasions set Jungle-fowls' eggs under domestic hens and reared the young. It was amusing to see how soon they showed signs of their wild nature. When about a fortnight or three weeks old, their wing-feathers were so long as to enable them to fly up into trees at any moment, while their foster-mother stood below wondering at an accomplishment she never witnessed in her own progeny. At night they much preferred roosting on some tree in the garden, and when a few months old they invariably went off to the woods."

On the other hand, Mr. Davison, referring more particularly to his experience at Neddivattam, on the other side of Ootacamund, says:—"The Grey Jungle-fowl breeds in October, November, and December. There never is any nest to speak of, the eggs merely being laid on some dry leaves, under clumps of trees, or a bush far in the jungle. The number of eggs in a nest apparently varies from six to ten."

Dr. Jerdon again tells us:—"The hen lays from February to May, generally laying from seven to ten eggs of a pinky-cream colour, under a bamboo-clump."

Lastly, Mr. Wait, writing from Conoor, informs me that "the Grey Jungle-fowl also breeds here. The egg is oval, of a deep buff colour, and measures 1.75 by 1.25.

"They lay in May and June."

According to this, these irregular birds lay in different parts of the Nilghiris from October to June—a fact which requires further verification. It must, however, be borne in mind that different portions of the Nilghiris are more or less respectively under the influence of the north-east and south-west monsoons, and that this may materially affect the breeding-season of this species, as it does of the Herons and other Water-birds.

The eggs vary much in size, shape, and tint ; but there are two extreme forms between which all others are intermediate links—the one is a long oval, with a fine compact hen's-egg-like shell, of a very pale creamy-white colour, and with only a faint gloss ; the other has a comparatively coarse shell, conspicuously pitted all over with pores after the fashion of Guinea-fowls' or Peahens', but yet glossy, is of a broad oval shape, slightly pointed towards the smaller end, and of a rich, almost deep, *café-au-lait*.

Between these two types, which no one but an oologist would at first sight believe to belong to the same species, every intermediate form, some of them thickly speckled in parts with brownish red, are met with.

The eggs vary from 1.68 to 2.05 in length, and from 1.21 to 1.5 in breadth ; but the average of twenty-five eggs measured is 1.84 by 1.38.

*Gallus lafayettii*, Less. *The Ceylon Jungle-fowl.*

*Gallus lafayettii*, Less., *Hume, Rough Draft N. & E.* no. 812 bis.

Of the Ceylon Jungle-fowl Mr. Layard tells us :—“ The hen selects a decaying stump or thick bush for a nesting-place, and lays from six to twelve eggs of a rich cream-colour, finely mottled with reddish-brown spots. Axis, one inch nine lines ; diameter, one inch four lines. The young are hatched in June.”

Colonel W. V. Legge, writing to me from Ceylon, says :—“ Like *Galloperdix bicalcaratus*, the Ceylon Jungle-fowl would appear to nest throughout a considerable portion of the year or else during the north-east monsoon at different times, the same pair rearing more than one brood, and thus continuing to lay until late into each season ; the latter may no doubt be the correct hypothesis. The facts of the case are these, however : young broods may be seen about with the parents in the south-west of the island as early as February. I have seen the same in the south-east at the beginning of July, and have taken eggs in the southern mountains on the 8th August.

“ The nest is situated in the jungle or forest, under the shelter of a tree, log, or bush, and consists of a hole or slight hollow scraped in the ground and a few leaves for lining. I have found it placed close to the trunk of a forest-tree between two projecting surface roots. The eggs are from two to four in number and vary in size and depth of ground-colour, and also in the quantity of the scanty markings which characterize them.

“ Four specimens varied from 1.62 to 1.77 in length, and from 1.26 to 1.35 in breadth. Two taken from the same nest are reddish buff with minute calcareous specks on the whole surface. The other two are stone-white, finely stippled all over with minute points of reddish grey, the former with a few faint small spots of the same hue at the obtuse end, the latter spotted more numerously at the same end with brownish red.

"The young brood continue with the mother for about two months, by which time they are three parts full-grown. They seem to evince considerable attachment to the parent, as I once shot a hen in the Eastern Provinces that was feeding by the side of a jungle-track with three grown-up young ones, which evinced considerable reluctance to leave her, running to and fro for a sufficient time to have allowed me to have shot them all.

"At times when the 'nilloo' (*Thunbergia fragrans*), a plant the seed of which the Jungle-fowl greatly affects, is in flower, great numbers resort to the jungles of the upper hills of the Nuvara Elia District. In 1868, a friend informs me, they bred on the Haughton Plains, not far from the sanatorium, in large numbers. In April the young broods were about with the hens, and when disturbed either took refuge in the undergrowth or flew off in the trees. My friend informs me that they were so numerous that he could have knocked over dozens with a stick as they alighted on the branches of the low jungle."

One egg sent me from Ceylon by Colonel Legge, taken in June 1874, is a very regular oval of the usual hen's-egg shape, only slightly more pointed at one end than the other. The shell is fine, smooth and glossy; the ground a delicate *café-au-lait*, everywhere minutely speckled with brownish red, and besides this sparingly spotted (the largest spot being about 0·08 in diameter) about the more obtuse end with rather bright brownish red.

This egg measures 1·71 by 1·31.

**Galloperdix spadiceus (Gmel.). *The Red Spur-fowl.***

*Galloperdix spadiceus (Gm.),* *Jerd. B. Ind.* ii, p. 541; *Hume, Rough Draft N. & E.* no. 814.

The Red Spur-fowl is abundant on the Nilghiris up to an elevation of 5000 feet, and may be met with up to their very summits. It is the Spur-fowl of Wynnaad, the Malabar Coast, and Western Ghâts, up to Mount Aboo and the Sirohee jungles. Jerdon says it is also the Spur-fowl of the eastern parts of Central India, in the high land between Nagpoor and the Nerbudda, and in the Vindhian Range. It is found also, he says, in the Rajmehal and Khurukpoor Hills. I found it north of the Ganges at Tickroogunj on the extreme limits of the Purneah District (associated here with *G. ferrugineus*, as it is at Aboo with *G. sonnerati*), and in the Nepal and Goruckpoor Terai.

Wherever it is found, it is, I believe, a permanent resident, and there breeds. It lays, according to the locality, from the end of February to the middle of June, and perhaps again in October and November, although of this I am not sure. It makes a slight nest, on the ground, of dry leaves and grass, often in a hollow scratched for the purpose, always in more or less dense undergrowth, and in many parts of the country, I am told (though this is not my experience), almost exclusively in bamboo-thickets. It is, I judge,

monogamous; certainly both cock and hen are usually to be found in the vicinity of the nests and in company with the young.

It lays from four to seven eggs, I should say, but others have found as many as ten. The hen seems to sit unusually close; at any rate I have twice known one captured by the hand by a native on the nest.

From Aboo Dr. King writes to me:—"This species is common at Aboo in the valleys, ranging as high as 4000 feet, but is most plentiful from about 1500 to 3000 feet above the sea. It prefers dense jungle about nullahs, where there is a thick undergrowth, and especially where there is much bamboo.

"I never took the nest myself, but its eggs were brought me during the early part of May, and my shikarees and the Bheels employed said that the nests were flat and shallow, composed of dry bamboo-leaves placed under, or even in the middle of, clumps of bamboo, in the deeper valleys."

Colonel Butler sends the following notes:—"The Red Spur-fowl is common all along the Aravallis. It is usually found singly or in pairs, and breeds like the last species during the hot weather. I have never seen the nest, but have often seen the chicks with the old birds shortly after they have been hatched, in May and June.

"Belgaum, 18th March, 1880, two eggs slightly incubated brought to me by a wood-cutter. There were more, but he could not remember how many, and broke the remainder bringing them in. Colour delicate creamy fawn, the eggs being much in shape and colour like deep-coloured eggs of *Ortygornis pondicerianus*, but of course considerably larger.

"Belgaum, 19th February, 1880, shot a hen Spur-fowl containing a perfect egg ready for extrusion."

And he found a nest at Mahableshwur in the month of April with seven eggs.

Messrs. Davison and Wenden, writing of the Deccan, say:—"Common along the ghâts. Nest procured in March, near Lanoli."

"On the Nilghiris," says Davison, "the Spur-fowl breeds in the same localities as the Grey Jungle-fowl and makes the same slight nest. The breeding-season, however, is in May and June. I have rarely found more than five eggs in a nest."

From Kotagheri Miss Cockburn remarks:—"They form their nests in woods on the ground among dry leaves, and generally lay from six to ten eggs of a dingy white colour, which are to be found in the months of February, March, and April."

Mr. J. Darling, junior, found the nest of this Spur-fowl in the Wynaad and at Kartary in the Nilghiris.

Mr. C. J. W. Taylor writes from Manzeerabad in Mysore:—"Common. Eggs taken in April."

The eggs are typically the same shape as a hen's, but much elongated and cylindrical Sand-Grouse-shaped varieties are common. All that I have seen have been entirely spotless, sometimes almost

glossless, at others fairly glossy, and varying in colour from a warm pinkish buff to a delicate fawn, a pale *café-au-lait*, or even creamy white.

In length they vary from 1.55 to 1.85, and in breadth from 1.13 to 1.3; but the average of twenty-five eggs is 1.67 by 1.28.

**Galloperdix lunulatus (Valenc.). *The Painted Spur-fowl.***

*Gallopardix lunulosus (Val.).* *Jerd. B. Ind.* ii, p. 543.

*Gallopardix lunulatus (Val.).* *Hume, Rough Draft N. & E.* no. 815.

The Painted Spur-fowl breeds in suitable localities in the eastern two-thirds of India south of the Nilghiris, and thence up the Eastern Ghâts and in all high broken country directly connected with these into Cuttack, the Tributary Mehals, Raipore, Bhundara, and, Jerdon says, the Mirzapoore and Monghyr Hills, though this latter requires confirmation. On the other hand, at Gumsur, in the north of the Ganjam District, Jerdon tells us that he only saw *G. spadiceus*. Again, immediately south of the Nilghiris it extends at any rate as far west as Palghât, as I have received several specimens thence.

From Raipore Mr. F. R. Blewitt writes:—"It breeds certainly from March to May, making simply a slight excavation in the ground for the eggs, under the shelter of a boulder or rock in a thicket. Some time in April 1871, from such a nest, made at the base of a large boulder in dense jungle, the egg-shells were taken from which the chicks had just escaped; again, in the same month under the ledge of a rock in thick underwood in a slight hollow in the earth, two fresh eggs were found.

"Apparently five is the maximum number of eggs. At least during two seasons, of the many broods met with, no single brood of chicks exceeded this number.

"The parent birds assiduously care for their young, and when disturbed exhibit great anxiety for their safety. When closely pursued, the old birds endeavour by many artifices to draw the attention of the intruders from the spot where the chicks lie concealed, and invariably on the cry of a chick wounded or captured, the parent birds daringly return to the rescue, often to within a dozen yards or so of the sportsman."

Mr. R. Thompson took a nest of this Spur-fowl in the Ahiri forests, south-east of Chanda, on the 5th April, and the late Colonel Tickell found one in June.

The egg of this species has a fine satiny shell with a more or less decided gloss. It is a moderately broad regular oval, and is of a uniform rich *café-au-lait* colour.

The eggs vary from 1.55 to 1.65 in length and from 1.07 to 1.15 in breadth; but the average of seven eggs is 1.62 by 1.11.

**Galloperdix bicalcaratus** (Penn.). *The Ceylon Spur-fowl.*

**Galloperdix zeylonensis** (Gmel.), *Hume, Rough Draft N. & E.* no. 815 bis.

Colonel W. V. Legge, writing from Ceylon, informs me that the Ceylon Spur-fowl breeds there during the south-west monsoon, and remarks as follows:—"The nesting-season of *G. bicalcaratus* would seem to extend over a considerable period, as I have had fledged young brought me at the latter end of May, and have taken the eggs myself on the 7th July in the same district, the Southern Province.

"The nest is situated in the forest or in thick jungle, under the shelter of a rock or near the projecting root of a large tree. It is merely a slight hollow scraped in the ground, with one or two dead leaves in the bottom to serve as lining. I am unable to state what the average number of eggs in the clutch is, as so little is known of the nesting of this bird,—the eggs in my own collection being the only specimens I believe in the possession of any collector; they were taken from the same nest and are two in number. The natives inform me that they lay four very often, and as I had four young ones brought me once with the old bird, I dare say their information is correct. They are oval in form and rather large in diameter for their length. My two specimens measured respectively 1·42 by 1·12 and 1·43 by 1·12.

"They are of a uniform cream-colour, one of them having small white calcareous polished specks all over it similar to those seen on the eggs of the Cochin-China fowls at times. The old bird was sitting on the nest at the time I found it and flew off with great swiftness; this I attribute, however, to my having come on the nest suddenly, otherwise she would doubtless, as most birds which nest on the ground do in similar cases, have left it stealthily."

Mr. Hart says:—"The nesting-season of this Spur-fowl is not restricted to a limited period. I have found the eggs myself in February, May, and October; it lays four to six eggs."

Eggs sent me from Ceylon are moderately elongated ovals, very similar to those of the other Spur-fowls, of a pale *café-au-lait* colour, very smooth and fairly glossy, and varying from 1·44 to 1·55 in length and from 1·09 to 1·18 in breadth.

### Family TETRAONIDÆ.

**Tetraogallus himalayensis**, G. R. Gray. *The Himalayan Snow-Cock.*

**Tetraogallus himalayensis**, Gray, *Jerd. B. Ind.* ii, p. 549; *Hume, Rough Draft N. & E.* no. 816.

In the Upper Sutlej Valley, Lahul, and Spiti this species lays in June, at elevations of from 12,000 to 17,000 feet. The eggs,

according to native collectors, are normally five in number. In shape they are long nearly perfect ovals, slightly larger and perhaps less pointed than those of the Moonal. The shell is moderately fine and glossy, showing everywhere minute pitted pores similar to, but much less marked than, those of the Peafowls. The ground is a paler or darker olive-brown, which is more or less thinly speckled and spotted, and at times blotched, with brownish red, pale chestnut, reddish or purplish brown. All the spots on each egg, and I think on every egg in the same clutch, are of the same tint. The larger markings are apparently always towards the small end of the egg. In size thirteen eggs that I have measured vary from 2·5 to 2·8 in length, and from 1·8 to 1·98 in breadth.

“ Mountaineer ” (Mr. Frederic Wilson), quoted by Dr. Jerdon, long ago told us that “ the eggs, which have been found by travellers, are about the size of those of the Turkey ; but, like those of the Grouse, are of a more lengthened form ; their ground-colour clear light olive, sparingly dotted over with small light chestnut spots.”

Later he wrote to me :—“ The Snow-Pheasant or Snow-Cock breeds at elevations from 12,000 to 17,500 feet, but very rarely on the southern side of the Snows. The hills near the source of the Ganges, and the Sutlej Valley above the junction of the Buspa, which are breeding-grounds, are in reality beyond the first Snowy Range, although a person may get to them almost without seeing snow. Both these places are breeding-grounds of the Snow-Pheasant, but by far the greater number of these birds which in winter are found on our side of the Snowy Ranges go up into Thibet to breed. The business of incubation commences about the end of May, and some eggs are laid as late as the beginning of July. The nest is a hole scratched in the ground under shelter of a stone or rock, a tuft of grass or a juniper or other bush of the high regions where it breeds. The Snow-Pheasants, and indeed all the rest of the Pheasants, exercise considerable ingenuity in picking out places for their nests, for they will almost always be found well sheltered from the rain. None make a nest,—that is, they bring nothing as material to it,—but nests, where grass and leaves are thick, get pretty well lined with these and feathers. I have never myself found a Snow-Pheasant’s nest with more than five eggs, and of three that I have lately examined, each contained that number ; but the paharis and Tartars assure me that they lay up to nine, and even twelve, and I have certainly seen as many as a dozen chicks at a time altogether. Still it is very possible these may have belonged to more than one brood. Snow-Pheasants are eminently gregarious and do not always separate into pairs for the purpose of incubation. Where a lot of young chicks are seen, several old birds will generally be seen too. The eggs are about 2·7 long by 1·9 wide, of a greenish hue, minutely speckled with brown, chiefly at the pointed end.”

Colonel Biddulph, writing on the birds of Gilgit, says :—“ Common everywhere in favourable ground. It makes its nest at

about 8000 or 9000 feet and breeds early. I procured a nestling about three days old on 28th May. Six eggs (which were hatched two days afterwards under a hen) were brought in the last week in June."

Dr. Scully records five eggs taken on the 28th April at 10,000 feet.

In shape the eggs are long, nearly perfect ovals. The shell is moderately fine and glossy, showing everywhere minute pitted pores. The ground is a paler or darker, more or less olive, more or less brown, stone-colour, more or less thinly speckled and spotted and at times blotched (though the blotches are never large, rarely more than 0.15 in diameter) with brownish red, pale chestnut, reddish, purplish, or almost umber-brown.

In size, twenty-five eggs measure from 2.5 to 2.8 in length and from 1.75 to 1.98 in breadth; but their average is 2.72 by 1.85.

**Lerwa nivicola, Hodgs. *The Snow-Partridge.***

*Lerwa nivicola, Hodgs.,* *Jerd. B. Ind.* ii, p. 555; *Hume, Rough Draft N. & E.* no. 817.

I need not apologize for never having seen an egg of the Snow-Partridge, when even Mr. Frederic Wilson, who has been amongst them for nearly thirty years, has never yet seen one,—nay, has been unable to find, even amongst the shepherds who see the birds daily during the breeding-season, any one who has seen a nest.

He writes to me from Gurhwal:—"Of the Snow-Partridge I have failed to get eggs. It breeds on the high ridges jutting from the snow at elevations of from 12,000 to 15,000 feet, where the ground is tolerably broken and roughish, neither very rocky nor on what we call 'slopes.' The hills between the head-waters of the Ganges and Jumna, and Tonse, are favourite breeding-grounds. The chicks have first been observed about the 20th of June. I have often come across them and been amused with the parent birds, both of which keep with the brood, counterfeiting lameness to entice an intruder away. This they do, I think, better than any Partridge I know, all but letting one catch hold of them. I have tried hard the last two months for the nest and eggs, and it would be difficult to decide whether I am more surprised or disappointed at the failure. Knowing so well where they constantly bred, I anticipated no difficulty whatever in procuring as many eggs as I cared for, but a lot of men, out constantly from 15th May to end of June, have been unsuccessful."

**Francolinus vulgaris. *The Black Partridge.***

*Francolinus vulgaris (Steph.),* *Jerd. B. Ind.* ii, p. 558; *Hume, Rough Draft N. & E.* no. 818.

The Black Partridge or Common Francolin breeds in suitable localities throughout India Proper (excluding Burma) north of an imaginary line drawn from the Runn of Cutch to Gwalior and

from Gwalior to Ganjam. I believe that this line as nearly as possible indicates the boundaries of the areas of distribution of this and the next species ; and though in some few places *F. pictus* does, I believe, straggle a little northwards of this artificial line, I do not think that the present species anywhere crosses it southwards.

It ascends the exterior ranges of the Himalayas throughout their whole length to elevations of 5000 or 6000 feet, but it does not, so far as my experience goes, cross the first Snowy Range. The Himalayan birds, it may be well to note, average smaller and are perhaps more brightly coloured than those of the plains of Upper India and Sind, but they are in no way specifically separable.

Grass, tamarisk, or similar jungle are essential to the Black Partridge, and they will rarely be found at any great distance from these two requisites. During parts of the year they seem to make their homes in densely-cropped cultivated lands, but it will always be where jungle to which they can retreat, when the crops are cut, is within reach.

They lay mostly, I think, in June ; a few lay somewhat earlier and later (I have found eggs in August), making their nests on the ground in tamarisk or grass jungle, or in any thick crop near these that may be standing (and there are few such) at that season ; of these the small millets reaped in some parts of the country in July are perhaps most often resorted to.

The nest, composed of grass and grass-roots, dry bamboo, grass-flag, or sugarcane-leaves, is sometimes very slight and loose, sometimes neater and more substantial ; usually it is placed in a depression hollowed out by the bird, and again not unfrequently there is scarcely any nest, only a lining to a hollow. It is always perfectly concealed.

They lay from six to ten eggs ; at any rate I have never known more to be found, and in former days, when shooting in the Ganges Kadir and the Terai in the hot weather, the beaters and dogs used to find nests daily, and I have thus seen a great many.

Captain Hutton remarks :—“This is a common bird in the Dhoon, and by no means rare in warm cultivated valleys far in the hills. It breeds in the hills in June, and a nest taken by a friend on whose accuracy I can rely, and who shot the old bird, contained six eggs of a dull greenish-white colour. The egg appears very large for the size of the bird, and tapers very suddenly to the smaller end.”

Dr. Jerdon says :—“The hen Partridge breeds from May to July, laying ten or twelve eggs (sometimes, it is stated, as many as fifteen) of a pale bluish-white colour, according to some writers ; but those I have seen were pale greenish when first laid ; and she usually has her nest in the grass, sometimes in an indigo-field, and occasionally in a sugarcane-field.”

Mr. Cripps found a nest with five fresh eggs, in the Western Duárs, on the 16th July.

Typically the eggs are what I should call spheroid-conoidal in shape, that is to say, broad blunt cones based on hemispheres. In colour and in shape they very much resemble specimens of the eggs of our Common Pheasant (*P. colchicus*) which I have from England. They are of course smaller, but by no means so much so as the relative difference in the sizes of the two birds would lead one to expect. They are moderately glossy and perfectly unspotted, and the colour varies from a slightly greenish to a brownish fawn-colour, or in some, as I ought perhaps to call it, stone-colour. Some of the eggs might perhaps be best described as drab-coloured.

The eggs vary greatly in size, from 1.36 to 1.8 in length, and from 1.18 to 1.38 in breadth; but the average of seventy is 1.56 by 1.28.

**Francolinus pictus (J. & S.). The Painted Partridge.**

*Francolinus pictus (J. & S.)*, *Jerd. B. Ind.* ii, p. 561; *Hume, Rough Draft N. & E.* no. 819.

The Painted Partridge or Francolin is found in suitable country in most parts of the northern half of the *Peninsula* of India, extending northwards, as noticed when speaking of the previous species, as far as a line drawn from the Runn of Cutch to Gwalior and from this latter to Ganjam. Here and there it may cross this line for a short distance, but I believe that this artificial line of demarcation will be found to be tolerably correct.

Writing from Oomraotee (Berar), Mr. J. Aitken says:—"The Painted Partridge (*F. pictus*) breeds during the monsoon. Shortly after the commencement of the rains, the birds may be heard calling loudly all over the fields, which are then covered with the young crops, and the greatest number of eggs are laid during the months of August and September. The nest is usually to be found in strips or isolated patches of grass and bush between cultivated fields. Five to eight eggs may be found in one nest."

Writing from Jhansi, whence he sent me many of their eggs, Mr. F. R. Blewitt remarked:—"This species breeds from the middle of July to September. The nest, which is usually placed on the ground in a slight excavation, and under the shelter of a bush or thick patch of grass, is made of roots of grass and grass itself loosely put together,—quite a common-made nest."

"The regular number of eggs is about seven or eight, in colour of a smoky-white generally, but when fresh-laid they are of a light reddish white, gradually changing to smoky-white as the process of incubation goes on. The fair average length of the eggs is 1.43 and breadth 1.19."

Dr. Jerdon notes that "the female breeds from June to August, laying seven or eight eggs of a creamy or smoky white, generally near the shelter of some bush."

Colonel Butler writes from Mount Aboo:—"The Painted Partridge is common in the plains, but does not ascend the hills. It

usually affects grass-beerhs, or preserves, and low bush-jungle, and breeds from the middle or end of July to the end of September, the greater number laying in August."

The eggs of this species are like those of the Black Partridge, typically very broad and obtuse at the large end and much pointed towards the small end. They are, however, more of the pectop-shape than these latter, the large end being flatter and less spherical. In size they are very much smaller than those of the Common Black Partridge, although in the birds themselves there is no such great difference, I think, in either size or weight. The colour varies a good deal; some eggs are drabby white with a very faint greenish tinge, others are brownish drab, others cream-colour, and some pale *café-au-lait*. They are spotless and somewhat less glossy than those of the preceding species.

In length they vary from 1.3 to 1.48, and in breadth from 1.1 to 1.25; but the average of a score is 1.4 by 1.18.

### Francolinus chinensis (Osb.). *The Chinese Partridge.*

Francolinus chinensis (Osb.), *Hume, Rough Draft N. & E.* no. 819 bis.

The Chinese Partridge or Francolin breeds within our limits only, so far as I yet know, in the comparatively dry portions of Upper Pegu. It does not, I believe, occur in the valley of the Irrawaddy lower down than Prome.

Mr. Theobald recorded having found a nest of this species at Meadey, a little north-east of Thayetmyo, on the 9th June. It was placed upon the ground, and contained four uniform greenish cream-coloured eggs, measuring 1.4 by 1.5.

From Thayetmyo Mr. Oates writes that this species "is particularly vociferous in June and July. I have never myself actually taken the eggs, but the Burmans say that the nest is situated at the foot of a bamboo-clump on a hill-side. I have had the eggs brought me in June. They are creamy or buffy white."

He very kindly also sent me specimens of the eggs taken on the 6th June.

These are much like those of *F. pictus*; they are of the usual Francolin, more or less pectop-shape, are dull and have little gloss, and vary from cream-colour to dingy olive-yellow or pale yellowish stone-colour. They measure 1.45 and 1.51, by 1.2.

### Caccabis chukor (J. E. Gray). *The Chukor.*

Caccabis chukor (J. E. Gr.), *Jerd. B. Ind.* ii, p. 564; *Hume, Rough Draft N. & F.* no. 820.

The Chukor breeds throughout the Himalayas (by preference where there are grassy hills and cultivated fields) from Nepal to Afghanistan, and thence throughout the ranges that under various names run down from Attock to the sea dividing the Punjab and Sind from Afghanistan and Khelat. It also breeds in the Salt

Range. In these hills and mountain-chains its range is from the level of the plains to about 11,000 feet, but a paler form, from Ladak, is found and breeds, I believe, at much greater elevations.

They lay in April, May, and June, a good deal according to elevation, and I have eggs taken by Mr. Wilson in Thibet at an elevation of 16,000 feet on the 29th of July. The nest, composed of a little grass or a few leaves, at times laid on the flat surface of the ground, at others in a slight depression, natural or scraped by the birds, is placed often in fields, often under the shelter of some tuft of grass or dwarf bush on a grassy hill-side, occasionally under some similarly-situated rock barely shaded by tufts of drooping fern.

I have taken many nests, but never found more than twelve eggs in any nest, and, according to my own experience, should certainly say that eight to ten were the usual number; others, however, seem to have found more.

Mr. W. Theobald makes the following note on the nidification of this species in the neighbourhood of Pind Dadan Khan and Katas in the Salt Range:—

“ Lay in April and May; eggs, twelve. Shape varies from ovato-pyriform to blunt ovato-pyriform. Colour, yellowish white or brownish cream-colour, faintly ringed and spotted with tan-colour. Nest, a few leaves on ground under bushes.”

From Gurhwal Mr. Frederic Wilson writes:—“ The Chukor breeds at all elevations, from 4000 to 5000 feet on the lower hills to 12,000 or 13,000 feet on our side of the Snowy Ranges, and to 16,000 feet beyond, and in Thibet. The nests may be found in cultivated fields, on grassy hill-sides, stony ravines, almost everywhere, except in forest or amongst precipitous rocks. They are (like those of all the rest of our game-birds) holes scraped in the ground. In the lower hills it begins to lay in April, in the higher in May; and I have found fresh-laid eggs in middle of June. The eggs are from seven to twelve or fourteen, sharply pointed, dirty white, minutely powdered with light brown. Some are spotted and blotched with the same.”

Dr. Scully tells us that in Nepal “ it breeds from May to June, usually at an elevation of about 6000 feet. On the 5th June a nest of the Chukor was found at Kakni Powah; it was on the ground under the edge of a rock, and well sheltered by ferns and small bushes. The nest was a mere pad of grass and leaves, and contained seven nearly fresh eggs, which were neatly arranged, six in a circle, with the small end pointing inwards, and the seventh egg filled up the centre.”

Colonel Biddulph remarks that in Gilgit the Chukor is “ very common. In summer it breeds at all elevations from 5000 to 10,000 feet.”

Major Wardlaw Ramsay says, writing of Afghanistan, “ I obtained one nest on the 16th of June.”

And Lieut. H. E. Barnes, also writing of Afghanistan, remarks:—“ The Chukor is very common on the hills, and in the

nullahs at their base, but is rarely seen far out on the plains. They commence to breed about the end of March, or early in April. There is no nest; the eggs are deposited on the ground in a depression under a bush. I have never found more than eight eggs; but the Afghans assert that they often lay 15 or 20."

The eggs vary a good deal in size and shape, as well as in type of colouring, but typically they are somewhat elongated ovals, a good deal pointed towards the small end. Pegtop and spherocnoidal varieties occur, but these forms are the exceptions in this species, while they are the rule in those of the three species of Francolin. The type of colouring too varies: in one type the ground-colour is pale *café-au-lait*, thickly speckled and spotted with purplish, reddish, or yellowish brown; in another the ground-colour is a pale creamy white or pale isabelline, and the eggs are pretty thickly blotched with pale purplish pink, the spots and blotches being occasionally slightly in relief, as if drops of white paint tinged with purple had been dropped on the egg. The eggs are moderately glossy, more so perhaps than in the Common Francolin, less so than in the Grey Partridge. The common type is that first described, and in some eggs the specklings are so excessively minute that the eggs, looked at from a little distance, appear a uniform somewhat brownish *café-au-lait*.

The eggs vary in length from 1.55 to 1.9, and in breadth from 1.15 to 1.3; but the average of seventy-six eggs is 1.68 by 1.25.

**Ammoperdix bonhami (G. R. Gray). *The Seesee Partridge.***

*Ammoperdix bonhami (G. R. Gr.),* *Jerd. B. Ind.* ii, p. 567; *Hume, Rough Draft N. & E.* no. 821.

The Seesee breeds alike in the Salt Range and throughout the rocky hills that westwards bound our Empire, from Attock to the Gulf of Oman.

This pretty little species is very common and tame in the Salt Range; a couple of dozens may be seen in a morning's walk, and if people are set to catch them large numbers are brought in. They are most generally seen running on the bare rocks or pecking about the droppings of cattle on the mountain-paths; but at Tobur,—some 2000 feet high, the rainy-season residence of the miners, who during the rest of the year reside in the Khewra Gorge (some 700 feet above the sea) and work the neighbouring Mayo Salt-mines,—I saw several pairs running about on the flat roofs of the empty houses. The males may often be seen perched on some rocky point; and the female in the spring, though less commonly seen in exposed positions, will always be found close to her mate. They run very rapidly and glidingly over the rockiest ground, rise pretty readily and fly smartly, always if possible down-hill. Both in gait and flight they remind one much of the Chukor.

Towards the end of March and early in April they may be seen  
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love-making, and towards the latter portion of April they begin to lay, hatching off as a rule some time in May, though I have found fresh eggs on the 1st June.

The nest is at best very slight, a little dry grass curled into a whisp, and generally seems to be only represented by a few blades of grass laid in a depression scraped by the birds. It is placed at times under some thick stunted bush or overhanging rock; more often in the midst of loose stones; occasionally in one of the scanty tufts of grass that here and there dot these bare hills. They breed at all elevations, from the level of the plains to at least 4000 feet. Eight is the largest number of eggs that I have seen in any nest, but many more are said to be at times found.

Mr. W. Theobald makes the following note on the nidification of this species in the neighbourhood of Pind Dadan Khan and Katas in the Salt Range:—

“ Lay in April, May, and June. Eggs, twelve. Shape varies from pyriform to ovato-pyriform. Size, 1·4 by 1. Colour, clear cream-colour. The eggs are laid in a slight hollow among stones in the hills.”

The late Major Cock wrote:—“ I have taken several nests of this bird near Nowshera in the low adjacent hills—dry, parched, and barren places which only a strong love of ornithology would ever tempt a man to enter during the month of May, when the heat is nearly unbearable. The nest is placed under a ledge of rock or between some stones. I once found one under a cairn of stones that had been erected by the herd boys. They lay from eight to twelve eggs. The nest scarcely deserves the name; a few dry bents, one or two feathers, and a hole in the ground is all the nest they prepare for the reception of their eggs.”

Writing from Afghanistan, Lieut. H. E. Barnes says:—“ The Seesee is not uncommon, but is not so often met with as the Chukor. It breeds at the same time and in precisely the same localities.”

The eggs of this species are quite of the Bush-Quail type, and though slightly larger are very close to those of *Microperdix erythrorhynchus*. In shape they are more or less lengthened ovals, a good deal compressed towards one end; some are slightly pyriform, and others, though these are the exceptions, more of the true Partridge shape. The texture of the shell is comparatively fine and close, but it is everywhere pitted with minute pores, which, however, are much less visible in some specimens than in others. Some of the eggs have a faint gloss; in others this is scarcely traceable. In colour they vary a good deal; some are almost pure white, but the majority have a very perceptible creamy or very pale *café-au-lait* tinge.

In length they vary from 1·3 to 1·5, and in breadth from 1 to 1·1; but the average of twenty is 1·4 by 1·03.

*Ortygornis pondicerianus* (Gmel.). *The Grey Partridge.*

*Ortygornis pondiceriana* (Gmel.), *Jerd. B. Ind.* ii, p. 569; *Hume, Rough Draft N. & E.* no. 822.

The Grey Partridge is found and breeds throughout the more open and drier plains country of India Proper. It eschews equally the more humid tracts of Lower Bengal, the Dhoons and Teraias that skirt the bases of the Himalayas, and the dense forests and forest-clad hills of Southern, Central, and Eastern India.

It lays from February to June, by far the most eggs being met with in April, and again from September to November. In all these months I have myself taken eggs, but comparatively very few in the autumn; and I have been unable to make out whether the eggs then found are a second laying of hens that have already laid in the spring, or whether they are only laid by birds that, owing to some accident, have had no spring broods.

The nest, when there is one, for I have repeatedly found the eggs on the bare ground, varies from a few blades of grass, a few feathers, or a few leaves, to a tolerably substantial pad-nest of grass and leaves. It is usually placed on the ground, under some large clod in a ploughed field, under a bush, or in a tuft of grass, but is sometimes fixed in the lower branches of some dense thorny shrub as much as three feet from the ground. Typically I should say the nest was a shallow depression well concealed under a bush or in a large tuft of high grass, and more or less neatly and thickly lined with grass.

I have never found more than nine eggs, and I have more than a dozen notes of finding only six, seven, or eight much-incubated eggs.

Mr. W. Theobald furnishes the following note on the nidification of this species in the neighbourhood of Pind Dadan Khan and Katas in the Salt Range:—

“ Lay in the first week of April and in May and September. Eggs, nine. Shape, ovato-pyriform. Size, 1·29 by 1·03. Colour, clear cream-colour. Nest, a little grass in a hole in the ground, usually sheltered by a bush, or in clumps of grass.”

Colonel G. F. L. Marshall writes from the Saharunpoor District:—“The Grey Partridge breeds here from March till May. I saw a covey of young birds about a week old about the middle of April; again on 7th April I found seven fresh eggs, on the 23rd April I found eight slightly-set eggs, and on the 17th May I again found seven slightly-set eggs. In one case the eggs were laid on a rough platform of grass and leaves in the middle of a tuft of surkery grass about 18 inches from the ground; in a second the eggs were on the ground at the foot of a tuft of grass; and in the third case the eggs were in a cup-shaped hollow sunk in the ground, lined very neatly with feathers and soft leaves, in the middle of a little karouna bush which was growing on the top of a tiny mound. The eggs vary from milky white to a uniform *café-au-lait* colour. The shell is very thick and rather rough.”

Major C. T. Bingham remarks:—"Breeds commonly at Delhi in March and April. Nest, a few straws placed in some hollow under shade of a tuft of grass."

The late Mr. A. Anderson wrote:—"The Grey Partridge lays from six to nine eggs in April and May; the eggs are deposited in a hollow, which the birds scrape out, most generally under the shelter of a clump of scrub jungle, and the standing grass is trodden down, which does for a nest-lining."

"On the 4th April, 1871, when out coursing on the *chur* lands opposite the Station of Futtéhgorh, I flushed a 'Grey' which was feeding in an open field. It struck me at once that this was the male, and that the female must be *sitting* somewhere, because these birds invariably go in pairs, and this was their breeding-season. Forming a line with my coolies, I beat every conceivable bit of cover (there was not a crop standing for miles), including a few clumps of sarpat grass which grew in the form of a hedge. Giving it up as a bad job, I rode alongside of this grass hedge (it had been charred), and looking *down* into the centre of each clump, soon discovered what at first appeared a hare in her *form*, but which on closer inspection proved to be the hen partridge. The grass was again well beaten, and, as a last resort, handfuls of earth and small stones were showered in on her from above, but without avail. Seeing how futile were all my efforts to flush the Partridge, I decided on capturing her on her nest, which was effected by my horse-clothing being placed over the clump, and the coolies making a rattling noise round the bottom of the grass, which eventually had the effect of making her rise perpendicularly. The nest was carefully *fenced in* with grass-stalks, of the thickness of an ordinary cane, so that ingress and egress for so big a bird must have been a matter of no little difficulty. A portion of the stalks having been cut away disclosed nine eggs; eight were hard-set, and gave me a deal of trouble to make them into good specimens, the ninth was *abnormally small* and *quite fresh*, measuring only '8 x '6.

Mr. J. Aitken remarks that "the Grey Partridge breeds in Berar in the beginning of the year. I have only once found the nest, but broken egg-shells may not unfrequently be found lying on the ground. The nest was of grass; it was well concealed under a bush, and contained six eggs of a creamy-yellow colour; as they were perfectly fresh, more might possibly have been laid. This was in the month of February. The birds nest—I may say, live—always in the vicinity of water, their favourite haunt being babool-jungle growing by the side of a stream, from which they come out morning and evening into the fields to feed."

Dr. Jerdon says that "this Partridge breeds chiefly in the dry weather, from February to May or June, the hen bird laying usually eight or ten eggs of a cream or stone colour, under a hedgerow or thick bush."

Colonel Butler tells us that in the neighbourhood of Deesa this Partridge breeds in February, March, and April, and again in

August, September, and October, and that at Belgaum he took nests in December and February.

In Ceylon this bird breeds twice a year, in August and December.

The eggs vary in shape from slightly elongated ovals, a good deal pointed towards one end, to broad pegtops, but an intermediate form is the most common. The shells are fine and glossy, and the eggs average decidedly smaller than those of our Common English Partridge. Their colouring too is of an entirely different type, and is the same as that of the eggs of the Bush-Quails, while that of the English Partridge in this respect more resembles those of the Francolins. The eggs are white, more or less tinged with *café-au-lait* colour, this tinge varying much in depth and intensity, probably (though I have not accurately noted the fact) chiefly according to the stage of incubation at which they are procured. The eggs are spotless, but are often, especially the paler-coloured ones, a good deal soiled and stained. I have never, out of some hundreds that I have seen, met with an egg that could be rightly called milky white.

In size the eggs vary from 1.2 to 1.42 in length, and in breadth from 0.95 to 1.12; but the average of fifty-four eggs is 1.3 by 1.03.

**Ortygornis gularis (Temm.). *The Swamp-Partridge.***

*Ortygornis gularis (Temm.),* *Jerd. B. Ind.* ii, p. 572; *Hume, Rough Draft N. & E.* no. 823.

I have only once shot, and have never seen a nest of, the Kyah or Swamp-Partridge, and only one of my correspondents has ever sent me its eggs or any notes in regard to its nidification.

Dr. Jerdon remarks:—"The Kyah breeds early in the spring in some localities, at all events from March to May, and at this time is very difficult to put up. The eggs are said to be laid under some thick bush in a dry spot, and to be white, like those of the Grey Partridge."

Mr. H. J. Rainey took a nest near Khoolna in Jessor. He writes:—

"April 13, 1875.—The accompanying nest and five eggs were discovered by one of my tenants, who said the Kyah, the Bengali name for the bird, was sitting, and flew away on his coming up to it. I had desired him to look out for these eggs, and, agreeably to previous instructions, he marked the spot and informed me of it. I proceeded there a short time afterwards, and when a little way from the place I heard the loud cackling of, evidently, the female bird, as if it had been disturbed, and on approaching closer to it, it rose and flew off in another direction; but having unfortunately neglected to provide myself with a fowling-piece, I could not secure it, though I saw it quite distinctly, and have not the slightest doubt it was the Swamp-Partridge. Besides, there is no other kind of Partridge; in fact no other species of gallinaceous bird build hereabouts within a circuit of five-and-twenty miles, as my experience of the locality enables me to confidently assert.

“ The nest and its contents I found on the ground in a field of *Rhar* and *Rashiya*, i. e. thatching or serrated grass and spontaneous sugar-grass (*Andropogon serratus* and *Saccharum spontaneum* respectively), close to the margin of a dry tank covered with dense jungle, and about half a mile from the nearest human habitation.

“ The nest is evidently constructed of the thatching-grass here specified. The eggs, five in number, were all fresh, warm, and apparently recently laid.

“ The nest is rather neatly formed and circular in shape, about 7 inches in diameter,  $1\frac{1}{2}$  inch thick on the sides of, and half an inch below, the central depression, where the eggs were deposited, and which is, say, 4 inches in diameter and a couple of inches deep.”

The eggs are broad ovals, slightly pointed towards one end, and one or two of them slightly compressed there. The shell is stout, full of pores, but withal glossy. In colour the eggs are a pale *café-au-lait*, and all exhibit somewhat more or less distinctly a pale purplish or purplish-brown speckling or stippling about the larger end; one or two of them also show signs of similar markings in other portions of the egg.

These five eggs vary from 1.44 to 1.5 in length, and from 1.16 to 1.23 in breadth.

***Perdix hodgsoniæ*, Hodgs. *Mrs. Hodgson's Partridge.***

*Perdix hodgsoniæ*, Hodgs., Hume, *Rough Draft N. & E.* no. 823 bis.

To Colonel C. H. T. Marshall I am indebted for an egg of this rare and beautiful bird, *Mrs. Hodgson's Partridge*.

Captain Barnes, of the 10th Bengal Lancers, found a nest, when after big game in Thibet, containing ten eggs, but, not knowing the value of the prize he secured, he unfortunately only preserved a couple.

Captain Barnes has himself most kindly favoured me with the following note on the subject. He says:—

“ This is what you may rely on, as I noted the facts at the time. I flushed the bird myself off the nest on the 12th July, 1872. The nest was at an observed elevation of 16,430 feet. I think (but am not now quite sure) that the nest was a mere indentation in the ground, it was in grass amongst low dwarf bushes. It contained ten eggs, all perfectly fresh. The Pass on which I found the nest leads from the Pangong Valley to the Indus Valley and is very high. I did not take the elevation, but estimated it at 19,000 feet, as my camp, after crossing the summit and descending some considerable distance, was pitched that night at 17,745 feet. There was a great deal of snow on the summit, which is perpetual; the snow-line at that season, I should say, was about 18,500 feet. The name of the Pass is the Oong Lung La. The birds were neither scarce nor plentiful, but there were enough to make it a matter of certainty in obtaining a specimen if required.”

The egg is in shape a long oval, obtuse at one end and sharply

pointed at the other. The shell is hard, compact, and everywhere closely pitted with minute pores, but it is very smooth notwithstanding, and has a very fair amount of gloss. The ground is a pale drab or clay-colour, but the whole of the large end has a faint reddish-brown tinge, as has also the extreme point of the smaller end.

The egg measures 1.77 in length by 1.2 in breadth.

**Arboricola atrigularis**, Blyth. *The Black-throated Hill-Partridge.*

*Arboricola atrogularis*, Bl., Hume, Cat. no. 824 bis.

For my only record of the nidification of this species I am indebted to Mr. Cripps. He says:—"On the 15th April, 1876, I secured a nest of this bird in Sylhet containing two perfectly fresh eggs. Again, on the 18th May of that year I secured four hard-set eggs from a nest. Both nests were placed at the foot of large trees which stood at the tops of *teelahs* or hillocks; a few scanty bushes grew about under the trees, but the whole place looked very dark and gloomy. The nests were mere linings of leaves and twigs which had been placed in slight depressions, apparently hollowed out by the birds. The *teelahs* were about 150 to 200 feet in height."

The eggs are all broad ovals, a good deal pointed towards the small end, and when fresh are apparently pure white, but as incubation proceeds acquire brownish or yellowish-brown stains. The shell is very fine and smooth, showing very few pores, and the fresh egg appears to have a fair amount of gloss.

Six eggs vary from 1.33 to 1.43 in length and from 1.1 to 1.13 in breadth.

**Arboricola rufogularis**, Blyth. *The Red-throated Hill-Partridge.*

*Arboricola rufogularis*, Bl., Jerd. B. Ind. ii, p. 578; Hume, Cat. no. 825.

Little is known about the nidification of this species. To Mr. Mandelli I am indebted, however, for one of its eggs. He found a nest on the 4th July, at Pattabong, below Darjeeling, at an elevation of about 4000 feet, containing four fresh eggs. The nest is described as having been a heap of dry leaves placed on the ground. The egg is a broad oval in shape, pointed towards the small end; in colour a sullied white with a few very minute grey specks dotted about on it; the shell rather fine and smooth, but with very little perceptible gloss. It measures 1.5 by 1.2.

**Arboricola intermedia**, Blyth. *The Arrakan Hill-Partridge.*

**Arboricola intermedius**, Blyth, *Hume, Cat. no. 825 ter.\**

I obtained a nest of this species containing six eggs on the 10th of May at an elevation of about 6000 feet near Machi in the Eastern Manipur Hills. The nest was a pretty large depression at the base of a tuft of grass scantily lined with dry bents. It was in the midst of grass about two feet high which was growing amongst thin scrub-jungle. When the nest was first found the bird rose from the egg within a yard of us, and was snared at the nest about two hours later.

The eggs are broad ovals conspicuously pointed towards the small end ; the shell is extremely fine, compact and close, and has a fine gloss, at any rate a fair amount of gloss. The colour is pure spotless white.

They measure from 1.46 to 1.52 in length, and from 1.13 to 1.19 in breadth.

**Perdicula asiatica** (Lath.). *The Jungle Bush-Quail.*

**Perdicula cambayensis** (Lath.), *Jerd. B. Ind. ii*, p. 581.

**Perdicula asiatica** (Lath.), *Hume, Cat. no. 826.*

This species appears to lay from September to February. The nest, always placed on the ground under the shelter of some bush or tuft of grass, is of moderate size, circular and shallow, more or less fitted into a corresponding depression of the soil and more or less neatly constructed of grass and roots. Five to seven eggs seem to be the full complement ; in one case a clutch of only four eggs was hard-set.

Colonel Butler writes :—" Six eggs were brought to me on the 19th September, 1880, taken by my nest-seekers about 7 miles west of Belgaum, belonging to this species, and two more nests containing four and five fresh eggs respectively were brought to me from the same locality on the 14th October. Subsequently I found a nest myself near the same place containing eggs exactly similar, from which I shot the old bird, and another nest of five incubated eggs on the 23rd November. The eggs are very similar to those of *P. argoondah*, but slightly larger, and some of them have a few faint reddish-brown specks scattered over the large end.

" This species is the only Bush-Quail in that locality, so there can be no mistake about the eggs. Mr. J. Davidson sent me an egg he took at Taloda, Khandesh, 14th October the same year."

Mr. Vidal, writing from the S. Konkan, says :—" I found a nest

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\* I omit *A. torqueola* from this edition as Mr. Hume has since pointed out that the eggs which he attributed to this species in the 'Rough Draft' did not belong to it --- Eb.

with two fresh eggs on the 17th January, 1879. The eggs were much pointed at one end. These are of a pale *café-au-lait* tint.

The eggs are regular ovals, more or less pointed (but never pronouncedly so) towards one end, have a faint gloss, and are in colour a spotless creamy white varying to a very pale *café-au-lait* tint.

They vary from 0·96 to 1·1 in length and from 0·79 to 0·9 in breadth ; but the average of seventeen eggs is 1·0 by 0·83.

**Perdicula argoondah (Sykes). *The Rock Bush-Quail.***

*Perdicula asiatica (Lath.)*, *Jerd. B. Ind.* ii, p. 583.

*Perdicula argoondah (Sykes)*, *Hume, Rough Draft N. & E.* no. 827.

The Rock Bush-Quail, the only species whose eggs I have myself taken, lays at any time from August to December and again in March, and for all I know may lay straight on all the year through ; but I have myself taken nests in all the months mentioned. I think they have two broods in the year, but cannot be certain ; anyhow March and September are the months in which I have found most eggs.

They always prefer semi-waste strips of land, covered with high grass and in the neighbourhood of cultivation, for nesting. The nest is slight, composed of grass loosely wound round into a circular shape, and is placed generally but not always in a depression, scratched for it by the birds, at the foot of some tuft of grass or under some thick bush.

Six or seven is the usual number of eggs laid. I have never seen, though I have heard of, more in a nest.

Writing from Jhansi, Mr. F. R. Blewitt says :—" The Bush-Quail, I do not know which, but I send you both birds and eggs " (and the birds were the *Rock Bush-Quail*), " breeds in August and September. The nest is merely an excavated cavity, from 5 to 6 inches broad, at the base of a thick patch of grass and quite under it. A few pieces of grass are laid at the bottom of the nest. The female sits very close on the eggs, and I have stood a yard from the nest without her attempting to rise ; only when I have brought my hand near to her has she flown off. The eggs are of a pale reddish white, and six appears to be the regular number of eggs, though probably it may be seven or eight. In average length they are 1·1, breadth ·83.

Writing from Oomraotee in Berar, Mr. J. Aitken remarks :— " The Rock Bush-Quail is very abundant here ; coveys may be started wherever there is the slightest cover. They breed during November and December. I have found the nest repeatedly ; it is composed of grass and placed under a bush. Sometimes it contains as many as seven eggs ; they are large for the size of the bird, and might pass for diminutive eggs of the Grey Partridge. Even at this breeding-season they seem to feed in company, and newly-hatched birds may frequently be seen running amongst half a dozen old ones. But the female continues to watch over her brood with the

utmost solicitude, and I have had to swerve my horse to prevent his setting his foot on one as she crouched anxiously over a chick."

Colonel Butler tells me that he found nests of this species near Deesa from the 17th August to the 27th November, and that five was the largest number of eggs he ever found in one nest.

Mr. C. J. W. Taylor took the eggs at Manzeerabad in Mysore on the 27th April.

Mr. Davidson writes that in both Sholapoor and the Pánch Máhals, this Quail bred in the latter parts of the rains among longish grass, the general number of eggs, and the most he has taken, being six. And referring to Western Khandesh, he says that he has taken eggs in all months but May, June, July, and August.

Typically the eggs are moderately broad ovals, a good deal pointed towards the small end; but more or less elongated varieties occur, and here and there pretty perfect ovals, or even eggs pointed at both ends, are met with. The eggs are white, glossy, and spotless, tinged, but far less deeply than in the Grey Partridge, with excessively pale *café-au-lait* colour.

In length they vary from 0.95 to 1.12, and in breadth from 0.78 to 0.91; but the average of forty-one eggs is 1.02 by 0.84.

### **Micropertix erythrorhynchus (Sykes). *The Painted Bush-Quail.***

*Perdicula erythrorhyncha (Sykes), Jerd. B. Ind. ii, p. 584.*

*Micropertix erythrorhynchus (Sykes), Hume, Rough Draft N. & E. no. 828.*

From the end of August until well into April, according to situation and elevation, eggs of the Painted Bush-Quail are to be found. As in the case of many other species, their season of nidification probably depends a good deal upon whether their habitat is exposed to the south-west or north-east monsoon. Possibly they have two broods.

Ten is, I believe, the full complement of eggs, but many more are said to be sometimes found, and perhaps two hens occasionally share a nest. The nest is placed on the ground under the shelter of some cover, and varies precisely as does that of the Rock Bush-Quail.

The Painted Bush-Quail is common throughout the hills and jungles of the Peninsula of India and on the west occurs as far north as the Satpooras, and, I am informed, at the Ghâts above Bombay. On the east, in the jungles of the Mahanuddy, Sumbulpoor and Sirgoojah in Chota Nagpoor, it appears to be replaced by a closely allied species, *M. blewitti*.

The present species is extremely abundant on the Nilghiris, whence (from Kotaghery) Miss Cockburn writes:—"The Painted Bush-Quail breeds in the months of January, February, and March, and again in September and October. They build no nests, but merely scratch shallow holes in the ground in which they lay from ten to fourteen eggs. A few minutes after the young are hatched

they are able to accompany their parents in search of food. I do not know a prettier sight than a brood of young Quails running after the old birds. They are such pretty little dark downy things, with three stripes of a very light cream-colour extending down their backs."

Mr. J. Darling, Junior, tells me that he has found the nests of this species in the Wynnaad and on the Nilghiris from August to November.

Eggs of this species sent me from the Nilghiris are long ovals, pointed towards the small end, somewhat glossy, spotless, and of a uniform, often very pale, *café-au-lait* colour. Both in colour and size these eggs are intermediate between those of the Grey Partridge and the Rock Bush-Quail.

In length they vary from 1.11 to 1.35, and in breadth from 0.87 to 0.95; but the average of thirty eggs is 1.22 by 0.91.

**Coturnix communis**, Bonn. *The Common Quail.*

*Coturnix communis*, Bonn., *Jerd. B. Ind.* ii, p. 586; *Hume, Rough Draft N. & E.* no. 829.

The Common Quail has been found breeding in the Punjab, the North-West Provinces, Western Bengal, the Central Provinces, and Satara, and more recently in Gilgit.

The nest is, as a rule, merely a slight saucer-shaped depression in the soil scratched by the birds, occasionally quite bare, generally thinly, at times pretty thickly, lined with fine stems and blades of grass. Ten eggs are the largest number that I know to have been found in India, and from several nests six and seven hard-set eggs have been taken. They lay from the middle of March to May.

I have only myself found a single nest of the Common Quail in India, and that was in April (29th) in the north of the Purneah District. The nest was a shallow saucer-like depression scratched by the bird and lined with a few blades of dry grass. It was placed in a tuft of grass and dwarf *Zizyphus* on a ridge separating two millet-fields. The nest contained nine eggs absolutely in the act of hatching off. We caught the female on the nest, examined the eggs, found the point of the bills protruding in two, so put them gently back, and put the mother gently on the top, where she sat winking at us in a most unbecoming manner, but never attempting to leave the nest.

I have but little reliable information about the nidification of this bird in India generally, but I believe that while the vast majority of those myriads which so often throng in Northern India our ripening wheat and barley fields in spring are true migrants, a few birds remain throughout the year in most parts of India, and breed with us as permanent residents.

Writing from Lahore, Colonel C. H. T. Marshall remarked:—“I found a Quail's nest, containing fresh eggs, on April 14th. The nest was in the corner of a tobacco-field; I saw the parent

bird. The nest was only a hollow scraped in the ground, at the root of a tobacco-plant, with a few bits of dry grass in it. The eggs were eight in number, and were a dirty yellowish white covered with small and large dark umber-brown blotches. I believe this is the first instance of a nest of this bird being noted in the Punjab. I fully believe, could I have got a good searcher, I should have found several others. This nest was half a mile from my house."

Mr. William Blewitt says:—"I only found one nest of this species, and that was in the Danah Beerh, near Hansi, on the 25th March. Under a wild plum or *Zizyphus*-bush a slight hollow had been scooped, and this had been lightly lined with leaves and straw. It contained three fresh eggs."

Colonel G. F. L. Marshall remarks:—"On the 25th March I obtained a nest of the Common Quail, *Coturnix communis*, at Allahabad. It contained six eggs nearly ready for hatching, and was situated, as described by Dr. Jerdon, on a little tuft of grass in a field in the Ganges Kadir surrounded by a good deal of jungle.

"As far as my observations go, the breeding of these birds in the North-West Provinces is very unusual, and the fact may be worthy of record. The Quails were in abundance at the time and afforded excellent sport. Perhaps none of the keen sportsmen who were out after them realized that some at least of the birds were breeding. It may possibly turn out to be the case that their breeding here may be more general than is supposed, and that they come for this purpose and not solely on account of the attraction of the grain-fields."

The late Major Cock found these Quails breeding most abundantly about Nowshera in April 1872, and Colonel Biddulph tells us that in Gilgit they breed in May.

The eggs of this species sent me from various localities closely resemble, but are all somewhat smaller than, those that I have procured in England. In shape they are broad ovals, a good deal pointed towards one end. The ground-colour is a clear yellowish or reddish buff, and they are thickly speckled and freckled, or more thinly spotted or blotched, with deep reddish brown or at times bluish black. The markings vary much in character and in intensity; some eggs are finely freckled and speckled all over, others have only a few large bold blotches accompanied by a few outlying spots and specks. They are only moderately glossy.

In length they vary from 1·1 to 1·2, and in breadth from 0·83 to 0·95; but the average of twenty eggs is 1·18 by 0·89.

***Coturnix coromandelica* (Gmel.). *The Black-breasted Quail.***

*Coturnix coromandelica* (Gm.), *Jerd. B. Ind.* ii, p. 588; *Hume, Rough Draft N. & E.* no. 830.

As to the limits of the area within which the Black-breasted Quail breeds, I have, I regret to say, no very definite knowledge.

In the Deccan, however, it breeds in multitudes, and it is to

Mr. Henry Wenden and Mr. James Davidson (both stationed at Sholapoor during the last breeding-season) that I am indebted alike for the greater part of the information I possess as to its nidification and for a truly magnificent series of its eggs.

August and September are the months in which it lays in the Deccan, and nine appears to be the full complement of the eggs, though as few as four are occasionally found more or less incubated, and the bird clearly does not commence sitting until she has laid the whole clutch.

Mr. Wenden writes:—"It was on the 28th July, this year, that I received my first warning that it was time to discontinue shooting these birds. On that day many of those we shot had well-developed eggs in them. For a week or so before this the bird had been calling vigorously, evident signs of pairing.

"On the 4th August I found and took a nest with four eggs.

"On the 7th                   "                   "                   one with six and another with the same number.

"On the 12th                   "                   "                   one with five.

"On the 14th                   "                   "                   one with six, hard-set.

"On the 25th September    "                   "                   one with nine, showing signs of incubation.

"All the eggs I found were deposited in hollows in the ground (some of them like the imprint of a cow's foot, others so slight as to be almost unobservable), without any lining whatever. The only case in which I noticed any pretence to a nest was on the 12th August, when I found five eggs in a cucumber-field. The bird had scraped a hole in a mass of decayed leaves. I noticed many nests besides those which I took; they were all of the same type, most of them in jowaree or bajaree fields, some few in grass, most of them close under the plants, or a bush, some of them in the bare open.

"In every case where I had an opportunity of watching the nests, the eggs were laid daily.

"The birds sit very close when hatching. I have watched several, and on two occasions attempted to cover the sitting bird with my hat. I have never seen a male bird on the nest or near the hen, but from the persistent way in which the males call and the females answer, I concluded that the male never went far away from the nest. I consider that the breeding-time may be fixed as beginning on 1st August and ending on 15th October.

"I never myself found a nest containing more than nine eggs, but Mr. Davidson found two containing respectively eleven and eighteen eggs, the produce doubtless of two hens, because, though I saw so many nests, I never found more than nine, though I always allowed *at least* two days to elapse after the last egg was laid before taking the nest.

"Four is the smallest number of incubated eggs observed."

Mr. Davidson remarks:—"The Rain-Quail breeds in great numbers round Sholapoor, and any number of eggs could be easily obtained there.

"I obtained various nests ; amongst others—

One brought to me on the 9th August contained five eggs.

One brought to me on the 12th August contained four.

One taken by myself on the 13th August contained six.

One brought in to me on the 18th August contained eight.

One taken by myself on the 18th August contained eleven.

*(All the eggs of all these nests were fresh.)*

"In the case of the last I shot the cock bird within ten yards of the nest, but he did not rise directly off them, as I was stooping to pick them up when he rose ; the hen did not rise, though, on beating about with only two men, several birds of the same species were flushed within two hundred yards. The eggs in this last nest belong to such very different types, that I am almost sure they must have been laid by different hens. And I can only account for it on the supposition that in a place like this, where great numbers are breeding close together, two hens may (as I have often known Partridges and Pheasants to do) lay in the same nest. In this case there were nine of the darker type, and two of the lighter in the nest.

"One thing about these Quails I noticed was the enormous number of nests that are destroyed. I hardly ever walked out without discovering broken eggs lying about ; but what animal was the culprit I never could be sure, though I suspect the Common Crow Pheasant and the large Lizard (Blood-sucker) are generally the offenders.

"The nests were of the most rudimentary description, a slight hollow with a few blades of grass or jowari laid in it formed the whole concern, and in one case even this was wanting and the eggs were laid in a hollow in the bare ground.

"The first nests I obtained were two, on the 9th August, containing five and eight fresh eggs respectively.

"The last, also containing five fresh eggs, was obtained on the 2nd October, but this was probably owing to a former nest being destroyed.

"Since the above was written I have found them breeding in the Deccan from the first week in August till late in November, and in the Pánch Maháls in August."

Dr. Jerdon states that "this Quail lays from six to eight eggs, generally of a creamy-pink colour with a few brownish spots, in a tuft of grass, in June and July."

According to Mr. Hodgson's notes, this species arrives in Nepal about the end of April, when there is usually some rain, and not till after a shower or two. They breed there during May and June.

Colonel Butler writes :—"Belgaum, 28th August, a nest containing 8 incubated eggs ; on the 15th September, a nest with 11 eggs (fresh), probably (as they were of two different types) the produce of two hen birds. Two more nests same date, each containing 8 fresh eggs ; and numerous other nests on the 20th, 21st, and 24th September, and all through October up to the 20th, containing fresh eggs."

Colonel Butler found this Quail breeding at Deesa in August and September.

The eggs of this species are excessively variable both in colour and size; but I observe that all the eggs of one clutch are, in the vast majority of cases, not only similar in shape and type of coloration, but also very uniform in size. So much so is this the case that I mixed up eight clutches (every egg dated), and then without once referring to the dates picked out each clutch merely by the look of the eggs without a single mistake. No doubt, in some few clutches, one, two, or more eggs of a different type to that of the rest occur; these, I believe, have been laid by other birds and not by the hen to which the nest belongs. They are excessively prolific layers, and I suspect not unfrequently, when anything has happened to their own nests, lay in any other nest that happens to come handy.

The eggs vary in shape from rather broad ovals, obtuse at both ends, only slightly compressed towards the smaller end, to somewhat more lengthened forms, rather conspicuously pointed towards the latter.

The shell is rather fine and smooth, with, in some cases, only a very faint gloss, but usually a tolerable amount of "shine."

The coloration is so variable that it is difficult to describe. The ground varies from a faintly yellowish white to rich *café-au-lait* colour, and in one clutch of nine eggs, taken on the 25th of September, possibly the second or third laying of an exhausted bird, has a strong ferruginous tinge throughout, as of dried blood.

The markings are of three types:—(1st) Fine specklings and spottings thickly spread over the whole surface of the egg; many eggs of this type strongly recall those of our several species of *Turnix*. (2nd) Bold blotchings and frecklings; some eggs of this type resemble much those of the Common Quail. (3rd) Marblings, not unlike what are sometimes exhibited in the eggs of Sand-Grouse.

In colour the markings equally vary—blackish, purplish, olive, and burnt-sienna browns, all occur; but each egg exhibits only one shade. With one exception the ground also seems to be always uniform, but in the speckly types, where the markings are purplish brown, and the ground is pale, large patches of this are suffused with a pinkish-purple tinge.

Typically the markings are closely set, but in some few specimens this is not the case. How much these eggs vary may be judged from the fact that to convey anything like an adequate idea of the series now before me, it would be necessary to figure at least nine examples, and yet there is not one amongst them that (now that I really know the egg) could be confounded with that of any of our other birds.

In length the eggs vary from 1.0 to 1.21, and in breadth from 0.8 to 0.89; but the average of fifty-six eggs that I have carefully measured is 1.09 by rather more than 0.83.

**Excalfactoria chinensis** (Linn.). *The Blue-breasted Quail.*

*Excalfactoria chinensis* (Linn.), *Jerd. B. Ind.* ii, p. 591; *Hume, Rough Draft N. & E.* no. 831.

In the Sub-Himalayan districts and ranges this Quail lays from the latter end of June till at least the second week in August. In Cachar, Mr. J. Inglis tells me that it lays in June and July. In the Malay Peninsula Davison took the eggs in March. The nest, always on the ground, usually in the midst of low short grass, though always close to thicker cover, is a mere depression in the soil, more or less thinly lined with blades and fine stems of grass. Six appears to be the usual complement of eggs, but in two cases only five and four eggs respectively were found, a good deal incubated.

Captain Hutton tells me that it breeds in the lower warmer valleys below Mussoorie in June and July, not commonly or regularly but occasionally, and to him I owe a single egg taken in July from a nest in one of the lower warmer valleys running into the Dhoon.

Dr. Jerdon says:—"In Purneah in the month of July it was the only Quail I observed. It breeds in this month, the eggs being pale olive-green."

In the Colombo district of Ceylon, according to Colonel Legge, this Quail breeds in May.

Mr. Oates writes from Pegu:—"A nest found on the 14th July was a mere pad of grass, placed in a clump of coarse grass. It contained five fresh eggs. They are slightly glossy and rather rounded. The ground-colour is olive-brown, and the shell is speckled with a few minute reddish-brown spots. They measure from 1·0 to 1·05 in length, by 0·77 to 0·7 in breadth."

The eggs are broad ovals, as a rule decidedly pointed at one end, and usually of a more or less pale, slightly olivaceous, drab or *café au-lait* with a faint olive tinge. Generally they exhibit some minute specks and spots, varying in colour from purplish grey to an obscure reddish brown. In some clutches these markings are excessively minute and sparse; occasionally they are almost entirely wanting, while most commonly they are pretty thickly set, with here and there a spot a fiftieth of an inch in diameter.

The eggs are always rather dull, and, though the shell is moderately fine and smooth, never seem to have more than a faint gloss.

They vary from 0·95 to 1·04 in length, and from 0·7 to 0·81 in breadth; but the average of a considerable series is 0·98 by 0·76.

## Family MEGAPODIIDÆ.

*Megapodius nicobariensis*, Blyth. *The Nicobar Megapode.*

*Megapodius nicobariensis*, Bl., *Hume, Rough Draft N. & E.* no. 803  
sextus; *id. Cat.* no. 803 oct.

The Nicobar Megapode breeds in most, if not all, the islands of the group from which it derives its name. On Table Island, an islet of the Great Cocos, I had reason to think that they also occurred and bred.

While in these islands both Mr. Davison, who obtained numbers of their eggs, and myself endeavoured to learn all we could of the nidification of the Megapodes, and I shall quote here what he and I have already recorded (*Stray Feathers*, vol. ii, p. 276 *et seq.*) on this subject.

Mr. Davison says:—"I have seen a great many mounds of this bird. Usually they are placed close to the shore, but on Bompoka and on Katchall I saw two mounds some distance inland in the forest. They were composed of dried leaves, sticks, &c., mixed with earth, and were very small, compared with others near the sea-coast, not being above three feet high and about twelve or fourteen feet in circumference; those built near the coast are composed chiefly of sand mixed with rubbish, and vary very much in size, but average about five feet high and thirty feet in circumference; but I met with one exceptionally large one on the island of Trinkut, which must have been at least eight feet high and quite sixty feet in circumference. It was apparently a very old one, for from near its centre grew a tree about 6 inches in diameter, whose roots penetrated the mound in all directions to within a foot of its summit, some of them being nearly as thick as a man's wrist. I had this mound dug away almost to the level of the surrounding land, but only got three eggs from it, one quite fresh and two in which the chicks were somewhat developed.

"Off this mound I shot a Megapode, which had evidently only just laid an egg. I dissected it, and from a careful examination it would seem that the eggs are laid at long intervals apart, for the largest egg in the ovary was only about the size of a large pea, and the next in size about as big as a small pea. These mounds are also used by reptiles, for out of one I dug, besides the Megapode's eggs, about a dozen eggs of some large lizard.

"I made careful inquiries among the natives about these birds, and from them I learnt that they usually get four or five eggs from a mound, but sometimes they get as many as ten; they all assert that only one pair of birds are concerned in the making of a mound, and that they only work at night. When newly made, the mounds (so I was informed) are small, but are gradually enlarged by the birds. The natives never dig a mound away, but they probe it

with a stick or with the end of their *daos*, and when they find a spot where the stick sinks in easily they scoop out the sand with their hands, generally, though not always, filling in the holes again after they have abstracted the eggs. The Nicobarese and the Malay and Burmese traders take numbers of these eggs, which they generally cook by placing them in hot ashes ; but they also sometimes boil them quite hard, and they do not seem to be very particular whether the egg is fresh or contains a chicken in a more or less advanced stage of development. The Nicobarese at any rate appear to relish a boiled or roasted chicken out of the egg quite as much as they do a fresh egg.

“ The eggs are usually buried from  $3\frac{1}{2}$  to 4 feet deep, and how the young manage to extricate themselves from the superincumbent mass of soil and rubbish seems a mystery. I could not obtain any information from natives on this point, but most probably they are assisted by their parents, if not entirely freed by them, for these latter, so the natives affirm, are always to be found in the vicinity of the mounds where their eggs are deposited.

“ We obtained about seventy of these eggs, sixty-two of which were preserved ; these vary much both as regards colour and size, and they undoubtedly darken very materially by being buried in the sand, for I have found that eggs containing chickens in a more or less advanced stage of development were dark-coloured, the depth of shade increasing as the eggs approached the hatching-point ; but it does not follow from this that all dark-coloured eggs will be found to be not fresh, for very often very dark-coloured eggs are laid. There are three types of eggs—a dull clayey-pink, an earthy-yellow, and an earthy-brown—of several shades.

“ The surface-soil of the mounds only is dry ; at about a foot from the surface the sand feels slightly damp and cold, but as the depth increases the sand gets damper but at the same time increases in warmth.”

I saw a considerable number of these mounds, chiefly at Galatea Bay, and there I examined some of them very minutely. These were situated just inside the dense jungle which commences at spring-tide high-water mark. It appeared to me that the birds first collected a heap of leaves, cocoanuts, and other vegetable matter, and then scraped together sand which they threw over the heap, so as not only to fill up all interstices, but to cover everything over with about a foot of pure sand,—I say sand, but this term is calculated to mislead, because it does not contain much silex, but consists mainly of finely triturated coral and shells. After a certain period, whether yearly or not I cannot of course say, the birds scrape away the covering sand-layer from about the upper three-fourths of the mound, cover the whole of it over again with vegetable matter, and then cover the whole in again with the sand. In the large mound, an old one, into which I carefully cut a narrow section from centre to margin, this arrangement was very perceptible ; in it I thought I could trace, by the more or less wedge-

shaped portions of pure sand along the base (the remnants of successive outer coverings of sand, the basal portions of which have never been removed), ten or perhaps eleven successive renovations of the mound ; even the central portion was perfectly cool. The vegetable matter had in a great measure disappeared, leaving only the hard woody portions behind, but showing where it had been by the discolouration of the sand. The decay of the vegetable matter and the bird's habit (as I judge from appearances) of not removing the basal portion of the sandy covering at each renovation, sufficiently explain why the mounds increase so much more in radius than in height.

A smaller mound, one as I take it still in use, though I could find no eggs in it, contained a much greater amount of vegetable matter, and was sensibly warm inside. I could make no section of it, as it was too full of imperfectly decayed vegetation. I believe that the bird depends for the hatching of its eggs solely on the warmth generated by chemical action. The succulent decaying vegetation, constant moisture, and finely triturated lime, all combined in a huge heap, will account for a considerable degree of artificial heat.

I am by no means satisfied that only one pair of birds use the same mound ; on the contrary, the Nicobarese I had with me that day explained, as I understood, that though one pair begin the mound, they and all their progeny keep on using and adding to it for years, and as "*Cussem*," or whatever the wretch's sobriquet was, interpreted, the men with us had, during the previous month, taken at one time some twenty eggs out of one and the same mound, which also they took us to see, and which was perhaps five feet high and sixteen or eighteen feet in diameter, and which was the freshest-looking I had seen.

The eggs are excessively elongated ovals, enormously large for the size of the bird. They vary a great deal in size and a good deal in shape ; all are much elongated, but some are more like Turtle's eggs than those of a bird. When first laid, they are of a uniform ruddy pink, as we know from having obtained one before the bird had time even to bury it ; after being buried, so long as the egg remains quite fresh, it continues a pale pink, but as the chicken develops within, the egg becomes a buffy stone-colour, and when near about hatching it is a very pale yellowish brown. The whole colouring-matter is contained in an excessively thin chalky flake, which is easily scraped off, leaving a pure white chalky shell below ; this outer coloured coat seems to have a great tendency to flake off in spots, specks, and even large blotches as the chicken is developed within. Quite fresh-laid eggs rarely exhibit any white marks of any kind, while those more or less approaching hatching (one cannot say incubated in this case) are invariably more or less mottled with white. Occasionally fairly fresh eggs are dug out, bearing along their entire length on one side two parallel white lines made apparently by the claws of the mother bird when scraping

the sand over them. The eggs are always a little pointed towards one end, and some, especially the less cylindrical ones, are conspicuously so. The shell is entirely devoid of gloss, and the surface is everywhere roughened with innumerable minute pores, which occur equally in the exterior coloured flake and the white, somewhat less chalky, shell beneath.

In length the eggs vary from 3.01 to 3.4, and in breadth from 1.9 to 2.25; but the average of sixty-two eggs that I have carefully measured is 3.25 by 2.07.

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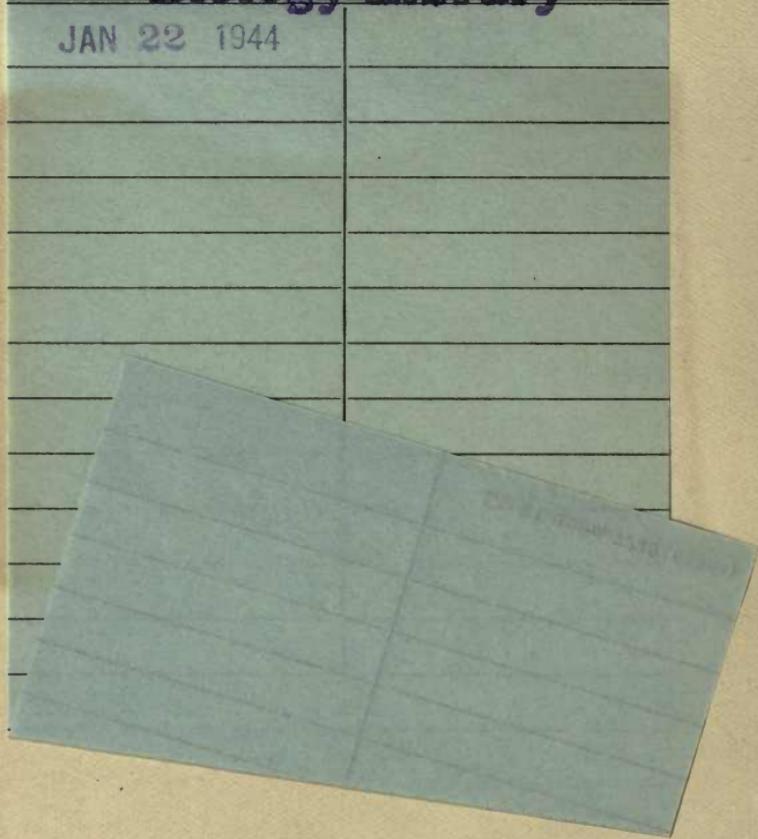
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